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Battelle Technical Review

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Induction Heating in Industry

DESIGN ENGINEER

ALBERT M. ROCKWOOD

The design and development engineer can contribute much to the success of all manufacturers of consumer goods, large and small. He can overcome the disadvantages that may result from the specialization that is characteristic of many such manufacturers. As Albert M. Rockwood points out, the design engineer, with broad experience, can bring ideas from many fields to bear upon the solution of problems in any one field. Thus, new developments in the field of aviation have been useful in the appliance, automotive, and other industries. At the same time, by working with specialists in various fields, the design engineer can utilize their know-how to aid in working out particularly difficult and unusual problems.

Al, as a member of Battelle's mechanical engineering division, demonstrates the possibilities of such cross-fertilization of ideas. Since coming to the Institute in 1947 as a design and development engineer, he has participated in and directed studies on dozens of problems in such fields as: fire-fighting apparatus, laundry equipment, automotive parts, air conditioning, mechanical and hydraulic aircraft components, restaurant equipment, household appliances, construction equipment, pneumatic equipment, vending devices, and production aids for industry.

Al began his professional career as a design engineer with the Curtiss-Wright Corporation, working on hydraulics and landing gear problems. Earlier he had graduated from Harvard University with an A.B. in mechanical engineering, and just before joining Battelle, he received an M.S. in machine design from The Ohio State University.

Evidence of Al's activities is to be found in the fact that his name appears on a half-dozen patents, pending or granted. He is an active member of the American Society of Mechanical Engineers.

The pride and joy of Al's life are his four young children, the oldest of whom just entered school. They give him adequate opportunity to keep alive his interest in photography, and a good excuse to develop his fishing skill for use when the boys are older.

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Research For Automation

EVERYONE IS INTERESTED in automation and opportunities it presents for lowering production costs. But when a company sets out to automatize its operations, it finds that automation is a hard thing to come by.

You can't, for instance, merely order a ready-made automatic production line to substitute for the one you have. You can't even buy a piece of control machinery that is immediately applicable to your operations. And, no matter how you may search, you will not find any one engineer who knows all the answers to your automation problems.

Available to the company wishing to automatize is a wide variety of hardware items, such as computers, control components, measuring and recording devices, and machine tools. These mechanisms make automation possible, but not until they have been integrated into a proved conceptual system does automatic production become a reality.

Automation, then, is an idea rather than something you can order from a catalogue. The idea is concerned with the use of control machines at every point possible along the production line to relieve men of routine tasks. The individual components of the automatized line are important, but the system is of primary significance.

The system involves not only the items of hardware, but also such things as plant layout, materials, materials handling, and the nature of the product and the processes used. To effect a workable system, radical changes may be required in processes and even in the product itself. Thus, to automatize radio and television production, printed circuits had to be developed to replace wire-assembled circuits. The goal of automation is always a product just as good or better than the one you are making now, but one produced automatically and at less cost.

Obviously, to achieve automation a company must have at its command scientific and engineering talents from many fields. The job, involving as it does the necessity of innovation and improvisation at many points, is really a research job rather than something that can be handled expeditiously by industrial management. Unless a company has available on its own staff the experts in electronics, mathematics, physics, mechanics, metallurgy, chemistry, and engineering that might be needed, it may be advisable to seek outside help from the very start. For, while it is true that you can't buy automation in a package, through contract research you can buy the mass technical abilities required to create an integrated automation system.

Contract research, the American-developed procedure for bringing the benefits of research to all industries, may readily be the key to the automation of the same industries.

Clyde Williams

President and Director, Battelle Memorial Institute

HOW BAD IS BAD?

Is a crack in a weld necessarily bad? In order to find out, as shown here, Battelle technologists are welding specimens of ship-steel containing a weld-flaw into a spherical steel pressure vessel. After each weld is completed, the sphere is cooled to 20 F and then placed under hydrostatic pressure which establishes tension stresses of between 20,000 and 30,000 psi on the specimen. If the flaw is severe enough, a brittle fracture starts at the flaw and travels across the specimen. After each test is completed, the specimen is removed for careful examination.

Economic Cathodic Protection

Cathodic protection is one of the best methods of preventing corrosion. It can be made even more effective and economical through the use of organic coatings to limit the cathodically protected area.

by BENSON G. BRAND

CORROSION IS RESPONSIBLE FOR tremendous losses in the United States each year—estimates place the total at more than a billion dollars annually. Scientists, naturally, are trying constantly to cut this staggering economic loss by developing methods of preventing the unnecessary wasting away of metals (mostly ferrous), which are the chief victims of the process. At present, three chief methods are utilized to limit corrosion—substituting corrosion-resistant materials when possible, covering metals with organic coatings, and cathodic protection. This article is concerned with what might be considered a fourth method of protection, the use of organic coatings in conjunction with cathodic methods.

Metallic corrosion is basically an electrical process and involves the movement of electrons from the metal, which serves as the anode, to a cathode, which may be rust or other material on the metal's surface. For corrosion to take place, something must be present to serve as an electrolyte or electron carrier, as for example water. Protection against this process may be obtained by sealing the metal surface to prevent an electrolyte from penetrating to the metal. A second protective method operates by reversing the above process, which makes the metal cathodic and thus prevents electrons from leaving. The reversal process, called cathodic protection, is accomplished by creating a current which presents a surplus of electrons to the iron atoms. Such a current may be created by placing a sacrificial anode near the metal to be protected or by introducing a current from an external source that will accomplish the same purpose.

To be really effective, cathodic protection requires a current strong enough to prevent electrons from leaving the atoms of the metal to be protected. A current density of 2-4 ma/sq ft is considered adequate to protect a steel surface. This can be maintained easily in waters of average hardness. Soft water, because of the absence of dissolved salts, tends to be electrically resistant to the point where an adequate current will not flow. Hard water, on the other hand, may carry currents as high as 15-20 ma/sq ft—greatly in excess of what is needed for protection. Since the amount of dissolution of the sacrifical electrode is proportional to the protective current flowing, the electrode is quickly and needlessly consumed by such a current. The larger the exposed area, the more current is needed. When sacrificial anodes are to be used, the protection of large exposed areas means that the anodes will be quickly dissolved and, therefore, must be replaced frequently—an expensive process. Scientists have discovered that the required current can be reduced drastically if the surface to be protected is coated. Then, only tiny areas, where faults or pinholes exist, will have to receive cathodic protection. Such small areas demand only a small current and radically reduce the consumption of the sacrificial anode.

Coatings used in connection with cathodic protection must stand up in the environments created by the

Since joining Battelle in 1946, Benson Brand has participated in and directed studies on the fundamental properties of organic coatings, development of formulas for the use of new raw materials, development of coatings for many special purposes, and the use of electronic instrumentation to predict the life of coatings. He has played an important part in converting tall oil, a waste by-product of the paper industry, into a valuable raw material for coatings. Earlier he served in the laboratories of the Pigments Division of the E. I. du Pont de Nemours and Company.

application of the required current as well as fulfill the other purposes for which they may be needed. For example, coatings may be desired for decorative reasons. In the case of sea-going ships, an antifouling coating is almost mandatory to prevent the encrustation of their hulls by marine life, which greatly reduces the ship's speed and efficiency.

In many cases, however, the purpose of the coating is primarily to decrease the amount of protective current required. This is true in the case of airplanes, moth-ball ships, and domestic hot water tanks.

Coatings for Cathodically Protected Surfaces

Because very complex circumstances govern the choice of coatings for any specific application, no one coating is universally used in conjunction with cathodic protection. A consideration of specific conditions, however, can lead to some general conclusions. The following are typical situations in which coatings are desirable.

• *Off-Shore Drilling Equipment.* The protection of off-shore drilling equipment—such as metal barges and drilling rigs—calls for some form of cathodic protection, in part, since it is exposed to sea water. With sea water as the electrolyte, electrical resistance of the completed circuit is very low, and the resulting currents are greatly in excess of the amount required for protection. Protective coatings are desirable, therefore, to keep the exposed surface small and to reduce the need for current as much as possible. There will always be, in any case, numerous flaws and scratches that cannot be avoided.

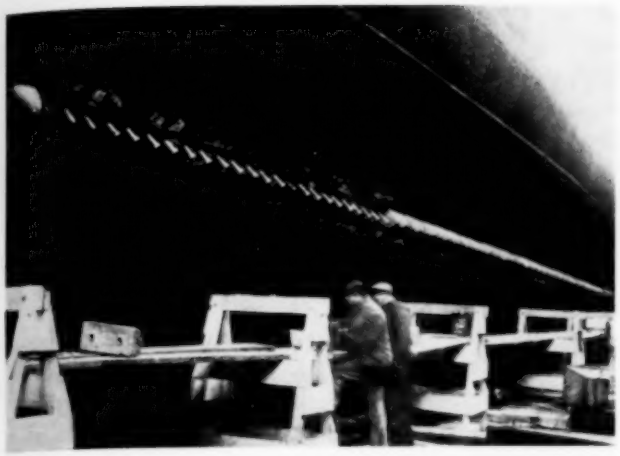
In this particular application, the coating generally consists of a thin layer of polyvinyl butyral-zinc chromate-phosphoric acid type of wash primer applied on the carefully cleaned steel surface, usually followed by several coats of an air-dried vinyl chloride-vinyl acetate copolymer-type coating. Experience has shown that adequate protection is obtained only when the coating is applied in thicknesses of six mils or more. Below that thickness, excessive blistering and porosity difficulties are encountered.

In off-shore drilling equipment, three types of exposure are present—atmospheric, including salt spray and petroleum products; tidal, with periodic exposure both to atmosphere and sea water; and marine, or continual exposure to water. Of the three types, marine exposure is easiest to combat because cathodic protection can be continual. In the case of the other two, however, the coating must be effective all or part of the time, since cathodic protection can be effective only when water is present to serve as the electrolyte. It is evident, therefore, that the choice of a coating for off-shore drilling equipment is not a simple matter. While the vinyl system, previously outlined, is currently used in the field, it leaves considerable room for improvement and further research is desirable.

• *Ships.* Ship bottoms, made of ferrous metals and in contact with sea water, are easy prey for corrosion. At the same time, they require an organic coating of the "antifouling" type to prevent the deposit of marine organisms on the hull. Coatings of this type, now being used, contain a material that is toxic to the fouling organisms. In most cases the binder used to contain this toxic material has the property of slowly leaching away, leaving a constantly renewed supply of toxic material on the surface of the hull.

Cathodic protection, to prevent corrosion of the steel hull of the vessel, must be planned to meet special conditions. Obviously, it must not upset the mechanics of the antifouling coating. In addition, the problem of protection becomes somewhat complicated by the fact that ships are operated in contaminated harbor water, brackish water, and fresh water as well as in sea water. Because the electrical resistance of these types of water are quite variable, the placing of the sacrificial anodes upon the hull must be carefully planned. Results obtained with several experimental ships indicate that the antifouling mechanisms of the coatings being used are not seriously disturbed by the application of cathodic protection and the electrical effects thus generated. The ship "Marine Chemist", for example, utilizes magnesium anodes for protection, which have performed satisfactorily for several years.

Extensive studies are now under way by the U. S. Bureau of Ships and the Maritime Commission on the application of cathodic protection, by means of an impressed voltage from a series of rectifiers, to the moth-ball fleet in the harbor at Wilmington, North Carolina. In this case, limiting the protective currents is highly important to prevent seriously overloading the rectifiers that supply the source of d-c voltage. The best remedy found thus far is an insulating coating to decrease effectively the area of the hull exposed to the electrolyte, thus maintaining the current density high enough to accomplish protection in voids and damaged areas. This work was reported on at the recent Sea Horse Institute Conference at Wrightsville Beach, North Carolina, in October, 1953.



Installing magnesium anodes for cathodic protection of the steel hull of the ship, "Marine Chemist". The anodes, one of which can be seen on the scaffold, are spaced away from the hull, but are connected to it electrically by the stud bolts that hold the anodes in place. Such protection, by decreasing the corrosion of the hull, greatly reduces losses entailed by the dry-docking process. (Courtesy Dow Chemical Company)

• *Pipelines.* Buried pipelines carrying gas and petroleum products are vulnerable to corrosive attack. Pipelines must be laid in soil of almost every kind imaginable, ranging from the highly alkaline soils of the West to very acidic swamp muds that give a wide range of corrosion conditions. These conditions must be overcome to minimize costly replacement of pipe.

The cathodic protection of pipelines by means of an applied potential is one of the major accomplishments of this method. The pipe is generally coated with an asphaltic or coal tar pitch hot-melt coating applied from 1/16 in. to 1/4 in. thick. This is followed by a spiral wrapping of manila paper while the coating is still soft and a second application of thermoplastic coating over the paper. These steps greatly reduce the protective current required, yet give a current density adequate to protect the pipe at breaks or flaws in the coating.

This protective method has one serious limitation—the fairly low softening point of the coating. The disadvantage is noted particularly on pipe at the discharge side of compressor stations on gas lines where the gas temperature frequently reaches 300 F. This temperature is high enough to cause a serious softening of the coating for distances of several hundred feet from the compressor where the gases cool off enough to prevent the softening. At present, this problem is being combated by carefully filling the trench around the pipe, to insure that no rocks or other abrasive materials rupture the coating when the pipe expands or contracts with temperature changes. At stream crossings, where the line is fastened to a bridge, normal painting procedures must be resorted to since there is no electrolyte for cathodic protection.

Recently there has been extensive experimentation with the use of vinyl tape, coated with a pressure-sensitive adhesive, for wrapping pipelines. Several sources, including both the suppliers and users, are claiming notable successes with this method. The tape usually employed for this purpose is 10 to 20 mils thick, and can be obtained in widths up to 24 inches.

• *Condenser Water Boxes.* The corrosion of water boxes of large boiler condenser installations is a major problem. These water boxes are usually constructed of cast iron, and the condenser tubes connected to the water box are usually of Monel, stainless steel, or some corrosion-resistant alloy such as cupro-nickel. The galvanic effects set up in such a system, where the cast iron serves as an anode to protect the tubes, are enough to cause serious corrosion of the cast-iron housing to the point where it must be replaced periodically. This is especially true in installations that employ sea water as the coolant in the condenser. Application of a coating to the water box, to reduce the protective current, retards its corrosion.

Several industrial concerns recommend coatings for painting the interior of the water boxes. One supplier recommends a thiokol type synthetic rubber coating, to be applied 1/8 in. thick.

The Dow Chemical Company has made a study of this problem at its Freeport, Texas plant, where sea water is used to cool ethylene oxide, and has reported the results in the April, 1954, issue of *Chemical Processing*. Dow found very few coatings that have an appreciable life under these conditions, and those that have a significant life usually develop pinholes, which are sites for corrosion accentuated over that found in bare metal. Moreover, use of a coating of the rubber type removed the cathodic protection usually relied on to protect the tubes by sacrifice of the cast-iron water box. This resulted in undue corrosion of the condenser tubes—much more costly than water-box corrosion.

Use of cylindrical magnesium anodes in the coated water box effectively stopped corrosion of both tubes and water box. The tests have been under way at Freeport, Texas for about five years, with no visible signs of corrosion. This installation has a carbon-steel water box, Monel tube sheets, and cupro-nickel tubes.

• *Transformer Cases.* Use of cathodic protection to prevent corrosion of transformer cases installed in

manholes in the New York City area has been the subject of investigation. Protection of these heavy-duty transformers is complicated by the fact that they are subject to complete or partial immersion in sea water at high tide and that they can reach temperatures of 140-150 F. Since no protective coating had ever been found that lasted for anywhere near the life of the transformer, it was decided to try cathodic protection to supplement the protection of the coating. The study showed that asphalt, phenolic, and baked-on synthetic resin coatings failed in a very short time by disintegration of the coating, while vinyl coatings failed by blistering. Because no really satisfactory coating has been found for the intended application, the study is being continued.

• *Water Tanks.* Water-storage tanks are protected, in many instances, by sacrificial-anode or applied potential methods. In most localities, coatings are not needed to limit the protective current. The water is usually hard enough to form a calcareous deposit in the tank, after a few months, which protects much of the surface and controls the cathodic reaction. Where the hardness of the water is limited or nonexistent, some type of coating is necessary. If the water is to be used for human consumption, materials of a toxic nature, such as red lead or zinc chromate, may not be used. In such cases, it is usual to employ coatings based on linseed oil and iron oxide.

• *Domestic Hot Water Heaters.* Cathodic protection of hot water tanks poses complicated problems for designers and development engineers, because of the varying conditions that must be met. The amounts of current provided by sacrificial anodes for protection of uncoated tanks differ greatly according to the hardness of the water. Moreover, the coating must resist the varying temperatures to be found in such tanks.

Cathodic protection of hot water tanks has been achieved, in most instances, by suspending a magnesium rod in the center of the tank as a sacrificial anode, the magnesium being dissolved in water as a harmless salt. Zinc rods have been used in a number of cases, but are considered less satisfactory than magnesium because they introduce some soluble zinc salts into the water. There also have been a few examples of the use of an impressed voltage, with a suspended graphite rod serving as the anode.

As in other cases of cathodic protection, an insulating coating on the interior of the hot water tank can be helpful. In the case of soft or low-conductivity waters, such a coating limits the current flow to pores or voids, thus insuring current densities high enough to afford protection to those areas. Where hard or high conductivity waters are present, the insulating coating decreases the area of the cathode and reduces the consumption of the anode.

At this point, it should be noted that it is not practical to use organic or ceramic coatings alone for the protection of domestic hot water tanks against corrosion. A coating must be absolutely continuous to afford complete protection by itself, and fittings and weld zones are difficult areas to protect by these methods. It is, therefore, desirable to use cathodic protection in conjunction with these methods. While no satisfactory solution has been found thus far, some data have been obtained that indicate a solution might be possible, provided enough care is taken in formulating and applying the coating.

More Research Required

Protection against corrosion is a never-ending task. In many cases, such as those discussed here, complete protection cannot be obtained by any single method. It is, therefore, advantageous to combine two or more methods in order to utilize the better features of each. When coatings alone and cathodic protection alone are unsatisfactory, combinations of cathodic protection and organic coatings often may be used successfully.

As has been suggested, no single coating material has been found that is universally useful with cathodic protection. Circumstances generally differ enough in the various applications to require a specific coating for each set of conditions. However, certain fundamental requirements are common: Resistance to cathodically produced products (mostly alkali), a high order of electrical resistance, and a high resistance to the penetration of water and water-borne chemicals. When a coating meets all the above requirements, it must still stand up under any special conditions that may be presented by the intended applications. If it meets all conditions, it then can be used to control the protective current, with appreciable savings in electrode costs or in current consumption.

It is evident from the above discussion that much more additional work should be done on this problem. Tremendous advances have been made in the last few years; new and improved coatings are constantly appearing on the market; and better methods of cathodic protection, involving improved mountings, higher purity metals and more efficient surfaces are contributing to better operation. Application of the principles involved here could result readily in tremendous savings in the future.

Induction Heating In Industry

Induction heating often can solve unusual industrial heating problems as well as compete favorably with conventional heating methods in many common processes.

by ALFRED F. LEATHERMAN

THE IMPORTANCE OF HEAT IN industry and in research is generally recognized and appreciated. Indeed, much study is being given to the problem of heating materials efficiently and economically. One method of heating, which is of growing importance and which holds promise of being even more broadly useful, is induction heating.

This highly adaptable technique of heating is enjoying a growing popularity because scientists, engineers, designers, metallurgists, and others are finding more possible ways of saving time and money through its use. Indeed, induction heating can be used in many cases where other methods are impractical.

Because heating by induction depends upon the flow of induced electric currents, it can be applied only to electrically conductive materials. Nonconducting materials often can be heated directly by combining them with conductive materials and indirectly by the use of a muffle or radiator. In general, the method is versatile with respect to size of operation. It may be used on tasks ranging from the hardening and selective annealing of such small products as individual surgical needles to the comparatively large scale melting of 85 tons of steel in a single charge.

After joining Battelle in 1951, Alfred Leatherman conducted investigations in electronic circuitry, particularly in communications and instrumentation. This work led to studies in the field of induction heating, and in particular to the application of such heating to surface hardening, welding of aluminum, and melting of high-temperature metals. He is an active member of the American Institute of Electrical Engineers.

CHARACTERISTICS OF INDUCTION HEATING

The important characteristics that distinguish induction from other heating methods are the following:

1. The heat is generated within the work and near its surface. By applying large amounts of power for a short interval of time, the surface of the work can be heated and cooled with little effect on the interior. On the other hand, with a slow heating rate, thermal conduction will distribute the heat uniformly throughout the work. Thus, both through-hardening and surface hardening to a depth of only a few thousands of an inch can be accomplished.

2. The portion of a surface to be heated and the depth of heating can be governed very closely. For this reason, there is little wasted heat.

3. Induction heating is rapid and has been called the fastest industrial heating method presently available; a temperature rise greater than 2000 F in 0.1 second is not impracticable. Heating can be gradual as well. Because of the speed with which heating may be performed, the work develops very little scale; speed, along with heating that is restricted to the surface, also mean very little, if any, warping of the work.

4. No mechanical or electrical contact to the work is necessary. Heat can be generated in conductors within an evacuated envelope by means of an external coil. Heating in inert or special atmosphere is convenient. When necessary, a small metallic charge can be supported for melting, solely by magnetic forces established by the electric currents, a process called "levitation melting". This application is of value in working with high-purity metals.

5. Very high temperatures can be obtained; practical work in the neighborhood of 4000 to 5000 F has been performed.
6. The total heat applied to a piece of work, the temperature, and other work characteristics, can be controlled accurately by automatic equipment.
7. It is usually easy to maintain pleasant working conditions in the vicinity of induction heaters. For many production installations, women workers are used.
8. The induction equipment can be operated by unskilled labor in a production application, a factor which makes for low labor costs.
9. Although induction heating is inherently expensive from the capital and power standpoint, the many advantages offered by this method often outweigh the costs. High capital equipment and electric power costs can be balanced against the the special advantages listed above. These include lower labor costs, accuracy, speed, cleanliness, and low stray heat losses. Moreover, many production installations of induction heating are easily adaptable to automation.

If one or more of the first five points listed above are involved in a heating problem, it is well worth while to consider induction heating as a possible solution. Before reviewing some of the interesting applications in which induction heating has paid its way, it may be of benefit to consider briefly the way that induction heating occurs.

Techniques of Induction Heating

Induction heating capitalizes on an electrical phenomenon that is usually unwanted or harmful in most electrical equipment, namely, resistive power losses. In the case of induction heating, however, the equipment is arranged so that a considerable portion of the losses occur in the work and appear as useful heat. The work to be heated, an electrical conductor, is usually placed within a coil of copper tubing (work coil) that carries alternating current from the supply equipment. The supply equipment can be an electronic oscillator, operating at frequencies from about 100,000 cycles per second (100 kc) on up; a motor-generator set, operating from about 2 kc to 10 kc; or, in some applications, simply a transformer connected to the 60-cycle power lines will serve the purpose.

The current flowing in the work coil establishes an alternating magnetic field in and around the work. This alternating magnetic field causes heating to occur in the work by a combination of several phenomena. The work to be heated and the work coil may be considered to constitute an electrical transformer with the work coil as the primary winding and the work itself as a short-circuited secondary "winding". In a transformer, the current flowing in the primary winding causes another current to occur in the secondary circuit. The amount of current that occurs in the secondary is determined by (1) the magnitude of current in the primary; (2) the characteristics of the circuit connected to the secondary (in this case, a short circuit); and (3) the degree of ease with which the primary current can cause the secondary current to occur, also called coupling. How good the coupling is depends on how close the secondary is to the primary, the type of material between the two, usually air, and the electrical frequency of the current in the primary. As the frequency is increased, the coupling generally improves. This analogy may serve to indicate that for efficient induction heating we need:

1. High coil currents
2. High frequencies
3. Close spacing between the coil and work

These values must be maintained in such relationship as to obtain the required results in the most economical manner.

When electric current flows in a conductor, it causes heat to be generated in the conductor. The amount of heat that is generated at any point in the conductor is proportional to the square of the current density at that point. If the current density is tripled, the heating will increase nine times. So, to make the heating show up in the work rather than in the coil or elsewhere, it is necessary to create large current concentrations in the work. Such current concentrations are established by the transformer action and by a phenomenon that may be called "skin effect".

By transformer action, there will be, under perfect conditions, a ratio of current in the work to current in the coil equal to the number of turns of the coil to the number of "turns" of the work. With a 10-turn work coil, there would be, ideally, 10 times as much current generated in the work as appears in the coil.

Skin effect is the interesting tendency of alternating currents to crowd near the surface of the conductor in which they are flowing. This effect becomes more pronounced with increasing frequency. It can be at-

APPLICATIONS OF INDUCTION HEATING

FIELDS OF APPLICATION	SPECIFIC USES
Heat Treating of Metals	Surface hardening, through-hardening, one-shot processes, progressive treatment of large or long pieces, edge hardening, annealing of steel, brass, and bronze.
Brazing and Welding	Brazing represents perhaps 50 per cent of the applications for which induction heating is used in the metal-working industries—it is rapid, semiautomatic, and gives reproducible results.
Soft Soldering	Hermetic sealing of cans, etc.
Preheating for Forging	May become the largest field of application as far as total equipment capacity is concerned.
Melting and Sintering	Automatic stirring action in the melt; sputtering of films; indirect heating of graphite crucibles; precision casting with centrifugal force; zone melting for purification of metals by recrystallization; levitation melting (support of work by magnetic field of coil); very high temperatures available for special metals.
Heating in Vacuum	Outgassing of tubes; firing getters; making glass to metal seals.
Processing of Nonmetallic Materials	Direct heating and melting of glass (mostly in Europe.) Heating plastic binders and glue for thermosetting through inclusion of magnetic powders.
Heating Tools	Induction heating of punches for rubber or plastic products; heating of tools for continuous piercing of wood; preheating of dies.
Salvage Processes	Salvage of rubber-clad metal pieces by breakdown of bonding, eg: tank treads and printing press rolls up to 8-10 feet long.
Indirect Heating	Intermediate element heated by induction: thermometer heating; dies and tools for forming glass-neon tube forming; gluing; attachment of nonconductors to metal parts heated by induction; heated pressure bars for sealing and packaging; use of indirectly heated furnace muffles; firing explosive rivets.
60-cycle Heating	Preheating and stress relieving of weldments, hot forming, expanding parts for fitting, heating chemicals passing through pipes.

APPLICATIONS WORTHY OF FURTHER STUDY

Hot Machining	Considerable increase in cutting speed, better finishes, less deformation, closer tolerances, machining of special high-temperature alloys.
Heating for Chemical Reactions	Selective heating of catalysts in chemical reactions. Shows promise particularly in the petroleum industry; heating of fluidized beds.
Heat Treatment During Continuous Strip Processes	Direct heating of strip has been used for finishing tin-plate at 1000 ft/min, use of indirect element for nonconductors or difficult applications.

tributed to the influence of surface currents on the currents flowing beneath the surface. The effect is quite prominent and acts effectively to "pile up" the current near the surface of the work and cause a corresponding large increase in the rate of heating at the surface. This heat then conducts rapidly into the work.

The use of 60-cycle current for induction heating poses a number of questions for those who have tried it unsuccessfully. In any induction-heating application, the heat energy transferred to the work is dependent on the density of the magnetic field and the frequency. High field densities are usually easier to obtain at higher frequencies. However, when the characteristics of the work are favorable for the creating of sufficiently high field densities, such as with magnetic materials, the handicap of operating at a low frequency can sometimes be overcome and useful heating is available. For these reasons, among others, the temperature that can be obtained in materials heated at 60 cycles is usually limited to the curie temperature where loss of magnetic permeability occurs.

In general, the quality of the results obtained is greatly affected by the equipment and by the arrangement of apparatus. Evaluating the feasibility of accomplishing a particular task by induction heating and planning the equipment for the job call for the services of trained specialists.

Surface Hardening by Induction Heating

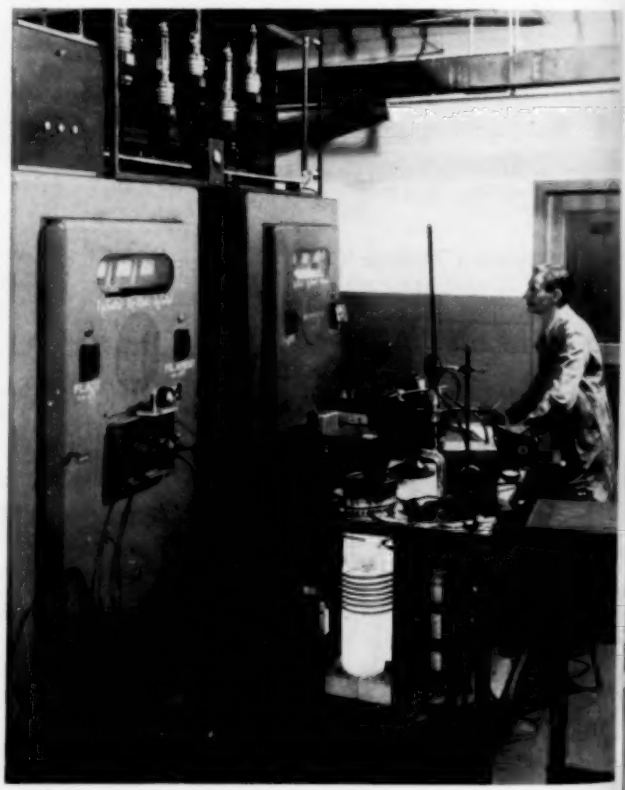
One of the most valuable applications of induction heating in industry has been in surface hardening. All of the first five characteristics of induction heating listed above figure prominently in this application.

The best steels for induction surface hardening are those which have a carbon content of 0.35 per cent or greater. They are treated by applying large concentrations of power for a short interval. The surface is heated above the transformation temperature and then quenched by one of several possible means. The depth of the hardened layer that is obtained depends only on the depth of the layer that was above the transformation temperature at the time of quenching, so long as the quenching rate and other metallurgical conditions are favorable. There is no need for long heating times; in fact, the treatment will be too deep if the heating rate is too slow. A heating period of only a few tenths, or even hundredths of a second is adequate in some applications. A carburizing or nitriding treatment to assist in hardening the surface is unnecessary and would be of little significance in such a rapid process.

The desired depth and shape of the hardened region are obtained by (1) proper choice of heating rate and duration of heating, (2) correct design of the inductor head that surrounds the work and to which power is supplied by the induction equipment, and (3) favorable quenching rates. The minimum limits of the hardened depth that can be obtained for a specimen are determined by the output frequency of the supply equipment, the rate of power input to the work, and the duration of the heating. This is true because of the very rapid rate at which thermal conduction spreads the generated heat into the specimen. Very high frequencies are necessary for very small diameters where the skin thickness is of the order of the work diameter. For example, a frequency of 30 million cycles per second (30 mc) was used for hardening and annealing the surgical needles mentioned above.

The interior structure of the work is not influenced by the usual induction surface-hardening treatment; the interior structure is established in the work prior to the induction process.

Water channels are often built into the inductor block for quenching in position immediately after the heat cycle. When sufficient concentrations of power are available, the temperature gradient created in the part by induction heating may be so great that after



Experimental high-temperature outgassing treatment of molybdenum tube electrodes in an evacuated quartz tube using a 50-kw induction heater.

the power is turned off, quenching will occur directly by thermal conduction into the body of the work (self-quenching). If water or oil quench were added under this condition, the results would show little difference.

When installed equipment capacity is limited, bulky sections or sections of great length may often be hardened in steps, or progressively. Bar stock is quenched as it emerges continuously from a small coil for uniform hardening.

Induction heating has been of special value in surface hardening crankshaft journals, for example, to improve their wear-resistance characteristics. Special inductor blocks with hinges can be used for heating the irregularly shaped chankshafts, and heating is restricted to the region beneath the inductor.

One of the most important factors in setting up a successful induction surface-hardening process is the design of the coil or inductor block that causes the heating currents to be generated within the work. The design process becomes more efficient as experience is accumulated in this field.

Versatility of Induction Heating

Induction heating has provided solutions to problems that appear to have no other practical approach. One example is the reverse of surface hardening such as would be performed on a through-hardened pin that must be annealed on its surface in order to cut a thread.

Huge rubber-clad steel rollers in printing presses become worn with use. To replace the entire roller would entail considerable expense. By using induction heating, it is possible to strip the rubber coating from rollers up to 8 or 10 feet long as they pass through an appropriate induction coil which heats the surface of the steel beneath the rubber coating. Formation of gas pockets at the interface of rubber and steel assists the removal.

The vacuum tube industry was one of the first users of induction heating in production-line installations. The electrodes of vacuum tubes are heated for outgassing, after assembly, by a coil outside the glass envelope. After evacuation, a small structure of active metal within the tube, called a getter is "fired" by induction to aid in collecting some of the remaining gases. Another process that would be difficult without induction heating is zone-melting purification. This process has been of great value in the purification of semiconductors.

A few applications that are recent, experimental, or that merit further study are suggested in the chart on page 55. The feasibility of hot machining was demonstrated as early as 1949, but has not yet seen wide application in industry. Induction heating for this purpose is well suited to existing machine tool installations. On the basis of experimental laboratory results, production increases of 200 to 300 per cent were realized in the machining of such materials as low-carbon, low-alloy steels and heat-treated medium-carbon and medium-alloy stock. Certain high-temperature chromium-cobalt alloys, commonly considered impossible to machine at room temperature, were processed quite readily when heated to 1500 F. The greatly improved quality of the finished part resulting from hot machining in combination with induction heating, suggests that the heating method will play an important role in the future throughout the metalworking industry.

Metallic catalysts in chemical process installations can be heated directly by induction heating for increased yields. Here the heat is applied directly to the catalyst with only incidental heating of the material under reaction and of the general surroundings. This method has not as yet been applied on a large scale, but it seems to show considerable promise, especially in the petroleum industry.

Induction heating of metal strip during rolling has been accomplished successfully in certain instances. The tin-plating on steel strip has been melted for finishing during processing at rates as high as 1000 feet per minute. Although equipment capacities are, of necessity, high in this application, the possibility of being able to heat strip material during such operations promises considerable savings.

Experimental work has been performed recently on induction heating of metallic fluidized beds for continuous-process chemical reactions. The results of these studies are incomplete, but the particular difficulties encountered with other heating methods alone seem to indicate that when the proper economic conditions exist, induction heating could provide a very successful process.

The side-line benefits of induction heating, such as its adaptation to high-speed production-line techniques, automatic control, and the utilization of unskilled labor, have helped to bring this technique into consideration even though other heating methods might provide results of equal quality. The continued decrease of electric power costs and improvements in technology have augmented the growth of induction heating, particularly in the last 15 years; hence the future for induction heating in industry is bright.

Notes From Battelle

DISTILLED ANHYDROUS HYDRAZINE

SINCE ANHYDROUS HYDRAZINE is an important component in rocket fuels and other products, an economical and plentiful source is of great importance. Until recently, it has been produced through an involved and expensive chemical process. As a result of an investigation at Battelle, however, a much less costly dehydration by azeotropic distillation has been developed and is now patented.

The process is described in a paper by R. Q. Wilson, W. H. Mink, H. P. Munger, and J. W. Clegg to be given before the Symposium on Azeotropic and Extractive Distillation of the American Institute of Chemical Engineers at Houston, Texas. It is described as a three-step process employing a hydrazine-water-aniline system. The steps include:

1. Distillation of an aqueous-hydrazine solution, a composition near that of hydrazine-water azeotrope, in the presence of 70 weight per cent aniline. About 70 weight per cent of the water was removed overhead as the aniline-water azeotrope.
2. Separation of the resulting aqueous hydrazine solution from the aniline.
3. Fractionation of the remaining enriched hydrazine-water solution to produce anhydrous hydrazine.

By this process, under optimum operating conditions, about 70 per cent of the hydrazine charged to the system can be recovered in one pass as essentially anhydrous material. The remaining 30 per cent is recycled through the process.

The process was developed at Battelle for the Olin Mathieson Chemical Corporation.

BASIC RESEARCH ON DRILLING

IN RESEARCH ON rock drilling, as in other fields, important basic data can be found through the use of simple, fundamental equipment. Thus the basic physical action in the common methods of rock drilling can be studied by evaluating the impact of a chisel edge on rock.

An experimental study of this type has been carried on at Battelle for Drilling Research, Inc., by Ralph Simon, D. E. Cooper, and M. L. Stoneman. They showed that the volume of rock fractured out per unit length of chisel edge was largely determined by: (1) the energy level of the blow of the chisel per unit length of chisel edge; (2) the indexing distance between parallel chisel blows in the rock; and (3) the strength of the rock.

The results of the study were found to be applicable to rotary rock bits as well as to the cable tool, the jack hammer, and the newer vibratory drilling machines. In the case of the first, the data are applicable because the force developed between a given tooth and the rock, as the rotary bit rolls, is momentary.

Formulas for the rate of penetration of a bit, which incorporate the amount of rock dislodged per unit length of chisel edge, were developed. One important result deduced from the formulas, relating to vibratory drilling machines, was that their rate of penetration should depend primarily on the mechanical power output at their bits.

OXYGEN IN GRAY CAST IRON

A MYSTERY has been puzzling technical and production experts in the cast iron field for some time. On the one hand, they know that gray cast iron, of normal silicon content, has an oxygen content that rarely exceeds 0.004 per cent by weight when produced. At the same time, there have been many reports of cast iron analyses showing oxygen contents as high as 0.047 per cent, particularly in castings that have been in use for many years. Does this mean that modern production methods are different from earlier ones? Otherwise, how explain the discrepancy?

In the course of a recent investigation at Battelle, metallurgists tried to produce high-oxygen cast iron. Despite their best efforts, no specimen contained more than 0.004 per cent oxygen by weight. This fact led R. C. Williams and H. W. Lownie, Jr., of Battelle's process metallurgy division, to suspect that something besides production techniques lies at the root of the mystery.

They studied three flake-type irons and one containing nodular graphite for a period of a year after production. Examinations were made at intervals during that period. At the beginning, the flake-type irons contained 0.0024 to 0.0037 per cent oxygen and the nodular iron 0.0011 per cent.

One flake-type iron had reached 0.004 per cent in one week, the other two the same amount by the end of the first month. By the end of the year, these three flake-irons had oxygen contents of 0.0070, 0.0110, and 0.0160 per cent. The nodular iron increased to only 0.0025 per cent during the year.

Williams and Lownie conclude that the answer to the puzzle appears to lie in the fact that gray cast iron can absorb oxygen when stored under average atmospheric conditions. This would explain many of the reports of high oxygen contents. The mechanism by which the metal absorbs oxygen, however, can, as yet, only be surmised.

IMPROVED CORRECTION FLUID

A NEW CORRECTION fluid is now available for use in preparing copy for offset and other reproduction processes. The opaque white substance, which dries in a matter of seconds, is simply painted over errors in the copy. Corrections may then be typed, written, or drawn on the new white, flexible surface, which will neither flake nor crack.

Corrections made with the fluid are not detectable in photographs; thus photo-offset and xerographic reproductions made from corrected copy come out clean. Use of the fluid also eliminates the need for time-consuming opaquing of film negatives and retouching of xerographic plates, which are usually necessary when cut-out or paste-on corrections are made on original copy.

The new correction fluid, which has been given the trade name SNOPAKE, was developed at Battelle under the sponsorship of The Battelle Development Corporation, a subsidiary of the Institute. Packaged in a brush-in-cap bottle, the product is being made and marketed by Fototype, Incorporated, Chicago, Illinois.

MEASURING PRINTABILITY

"PRINTABILITY" IS A TERM that is widely used in the printing industry, but one which has never been sharply defined nor given a definite technical meaning. In general, printability is considered to include the description of various factors that affect the final printed product, such as the properties and conditions of paper, ink, printing forms, and presses.

As a means of getting objective evaluations, however, R. M. Schaffert, technical adviser of Battelle's graphic arts division, suggests that printability should include only factors that can be measured objectively. In a paper given before the Symposium on Printability of the Technical Association of the Graphic Arts, he presented this tentative definition: "In the art of impression printing, (printability is) the degree of correspondence between resolution, contrast, and tone density of the print, and the resolution, contrast, and tone density inherent in the printing plate surface."

Schaffert points out that if such a definition were adopted, agreement would have to be reached upon methods of measuring the properties involved and upon a standard printing pattern for laboratory tests. Then printability factors could be measured, and it would be possible to determine the effects of various properties of paper, ink, and press conditions on printability.

HOT-LUBRICANT-RESISTING RUBBER

THE INCREASED operating temperatures of our high-speed aircraft are creating demands for more heat-resistant lubricants. Technologists have discovered that Turbo Oil-15, a di-ester base material, is one of the most promising lubricants for aircraft use. Where this new lubricant comes in contact with rubber, the rubber must resist it for at least 500 hours at 350 F.

The results of an investigation of such rubbers, are to be reported at the meeting of the American Chemical Society on May 5 by W. J. Mueller and R. A. Clark of Battelle. The research, which they directed, included a study of mixtures of varying types and amounts of acrylate polymer, vulcanizing agents, fillers, lubricants, and antioxidants. The most promising results were obtained with a copolymer of ethyl acrylate and chloroethylvinyl ether. The best hot-oil aged properties were found in a curing system consisting of a careful balance of triethylene tetramine, sulfur, and tetramethyl thiuram disulfide. The best performing reinforcing filler was found to be a calcium silicate pigment, Silene EF. Relatively higher filler loadings and longer curing times aided in reducing rubber swell, and a small amount of stearic acid, employed as a lubricant, aided processing.

As developed, the final product met all the minimum target requirements, except that the swell, after the 500-hour immersion test, was 6 per cent above the 30 per cent maximum desired.

STUDY IN LEBANON

A PROGRAM of assistance to industry in the Republic of Lebanon has been begun by Battelle. An initial contract, covering the work through March, 1956, was signed by the Industry Institute of Lebanon and Battelle. The objective of the project, as described by Richard J. Lund, manager of Battelle Institute's department of information and analysis, is to bring about a rising level of industrial activity, thereby raising the economic potential of the eastern Mediterranean country. This could probably be brought about, he explains, through the application of American know-how to Lebanese industry in both the broad fields of industrial management and technology.

A team of Battelle specialists will gather the necessary data for the study in Lebanon. The project is being carried out as a part of the Technical Cooperation Program of the Foreign Operations Administration.

WORLD IRON ORE RESOURCES

AMONG NATURAL RESOURCES, iron ore is one of the most important to man. Recognizing this fact, the United Nations, through the Economic and Social Council, asked a group of experts to prepare a world survey of iron ore as a first step in a study on the conservation and utilization of all important natural resources. As a result of this request, a compilation of important papers on the subject has just been published under the title, *Survey of World Iron Ore Resources: Occurence, Appraisal, and Use.*

Among the papers in the *Survey* is one on "Beneficiating Iron Ore (North American practices)", by John D. Sullivan, Battelle technical director, which summarizes recent work in iron ore beneficiating techniques. His presentation of the subject served as a background for the Committee's consideration of the changing concepts of various types of ores. He covers the subject broadly, emphasizing United States beneficiation techniques described in the literature since 1940. The paper includes description of typical processes and layouts. An extensive bibliography also is appended.

Hamnett P. Munger, also of Battelle, contributed a paper on "Cost Factors in Selecting Processes for Producing Iron and Steel". In it, he presents estimates, based on published literature, of the costs of production of iron and steel in existing plants in various locations throughout the world. The data are given in a form that will be helpful in making rough approximations of the cost of carrying on production by various processes in plants at any specific location. The article also contains a specific example of how such an approximation would be arrived at for a plant located in eastern United States and adjacent to an Atlantic shipping center.

Reprints of the two papers are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

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THE EIGHTH VOLUME of *Organic Reactions,* of which Dr. Roger Adams, Battelle trustee, is editor-in-chief, was published recently. The volumes of this series are collections of chapters, each chapter being devoted to single reactions or to definite phases of reactions, which are of wide applicability. The current volume covers the following subjects: "Catalytic Hydrogenation of Esters to Alcohols", Homer Adkins; "The Synthesis of Ketones from Acid Halides and Organometallic Compounds of Magnesium, Zinc, and Cadmium", David A. Shirley; "The Acylation of Ketones to Form β-Diketones on β-Keto Aldehydes", Charles R. Hanser, Frederic W. Swamer, and Joe T. Adams; "The Sommelet Reaction", S. J. Angyal; "The Synthesis of Aldehydes from Carboxylic Acids", Erich Mosettig; "The Metalation Reaction with Organolithium Compounds", Henry Gilman; "β-Lactmes", Harold E. Zaugg; and "The Reaction of Diazomethane and Its Derivatives With Aldehydes and Ketones", C. David Gutsche.

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Two of Battelle's Columbus staff members have been assigned to administrative posts in its European operations. R. Q. Wilson becomes the United Kingdom representative for the Institute and is now stationed in London. Leo Bailey, who is now on a temporary assignment as Battelle's representative in Madrid, will move to Geneva as an assistant to Dr. Frank C. Croxton, director of the Institute's European operations.

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Glenn Fuller, who until recently supervised Battelle's Florida Research Station, has been reassigned and is now at the Institute's agricultural laboratory and greenhouse in Columbus. He will continue to maintain close liaison with the research activities at Battelle's Florida Station.

Writings by Staff Members*

Effect of Shape on Thermal Fracture. E. M. Baroody, E. M. Simons, and W. H. Duckworth. *American Ceramic Society, Journal,* January, 1955, pp. 38-43.

Presents theoretical and experimental work on thermal fracture of brittle materials by studying radial, steady-state, heat flow through hollow cylinders of several shapes and materials. Preliminary results indicate that the maximum heat throughout before failure can, in many cases, be expressed as the product of two factors, one of which characterizes the shape and the other the material.

Mescaline Analogs II. Tetra- and Penta-Methoxy-β Phenethylamines. F. Benington, R. D. Morin, and Leland C. Clark, Jr. *Journal of Organic Chemistry,* January, 1955, pp. 102-108.

Describes the synthesis of all of the theoretically possible ring-substituted tetramethoxy-β-phenethylamines and of pentamethoxy-β-phentheylamines. All of these compounds were prepared in order to study their possible effect on the respiratory enzyme activities of brain tissues.

Effective Presentation: In Print and on the Platform. W. A. Koehnline and C. R. Tipton, Jr. *Nondestructive Testing,* November-December, 1954, pp. 13-21.

Discusses organization of material, dynamics of language, mechanics of style, and other factors important in both the oral and written presentation of papers.

Flame-Stability Studies on an Inverted Bunsen Burner. Philip F. Kurz. *Industrial and Engineering Chemistry,* January, 1955, pp. 121-127.

Stability experiments with hydrocarbons and hydrocarbon mixtures show that the lean and rich blow-off limits of upright and inverted flames are essentially identical, probably because the flowing gas stream prevents convective transfer of heat into the unburned gases.

Machine Literature Searching. VII. Machine Functions and Organization of Semantic Units. Fred U. Luehrs, Jr., Allen Kent, J. W. Perry, and M. M. Berry. *American Documentation,* January, 1955, pp. 33-39.

Suggests a logical basis for analyzing the subject content of documents to render them amenable to identification by machine-searching operations.

Cathodic Protection. Morris Mote. *Mines Magazine,* December, 1954, pp. 35-38+.

Discusses cathodic protection as the fastest growing tool for the prevention of corrosion of steel structures in natural environments.

Gas Valve. Cornelius A. Papp. *Review of Scientific Instruments,* December, 1954, pp. 1224-1225.

Describes the principle and operation of a positive-action glass valve for maintaining constant pressures in gas-phase reactions.

Report on the Elevated-Temperature Properties of Selected Super-Strength Alloys. Ward F. Simmons and Howard C. Cross. *ASTM Special Technical Publication No. 160.* American Society for Testing Materials, Philadelphia, 1954.

Presents a graphical summary of the elevated-temperature strength for 13 selected super-strength alloys. Includes data for tensile, creep, and rupture properties.

Apparatus for Determining the Settling Rates of Slurries. C. V. Weaver. *Instrument Society of America, Journal,* December, 1954, pp. 24-26.

Describes an automatic recording balance for measuring the sedimentation rates and, indirectly, the particle-size distribution, of slurries at room and at elevated temperatures.

Transverse Hall and Magnetoresistance Effects in p-Type Germanium. R. K. Willardson, T. C. Harman, and A. C. Beer. *Physical Review,* December 15, 1954, pp. 1512-1518.

Modification of the two-band model for semiconductors to include existence of a small number of high-mobility positive carriers, permits calculation of the magnitude, temperature dependence, and magnetic field dependence of the Hall and magnetoresistance effects in high-purity p-type germanium.

S-Triazine Derivatives—A New Class of Fungicides. Calvin N. Wolf, Paul H. Schuldt, M. M. Baldwin. *Science,* January 14, 1955, pp. 61-62.

Reports fungitoxicity data on S-triazine derivatives, which are now being evaluated in field trials as fungicides.

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**Members of the Battelle staff are authors of the recently published articles and books listed on this page. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.*

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BATTELLE TECHNICAL REVIEW ABSTRACTS

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***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

6132 The Role of Fluid Mechanics in Aeronautical Development. G. N. Patterson. *Aeronautical Engineering Review*, v. 14, Feb. 1955, p. 27-39.

Progress in the understanding of fluid mechanics and its influence on aerodynamics. Tables, diagrams, graphs, photographs.

6133* The Distribution of Pressure on an Aerofoil, in a Stream With a Spanwise Velocity Gradient. W. A. Mair. *Aeronautical Quarterly*, v. 6, Feb. 1955, p. 1-12.

Includes diagrams, tables, graphs. 5 ref.

6134* Explosive Limits in Aircraft Fuel Tanks. E. M. Goodger. *Petroleum*, v. 18, Mar. 1955, p. 81-85, 106.

Effects of fuel temperature, altitude, fuel spray, air release, "breathing", and tank pressurization make it difficult to find completely safe operating conditions for any fuel. Graphs. 16 ref.

6135 The Effects of Various Parameters, Including Mach Number, on Propeller-Blade Flutter With Emphasis on Stall Flutter. John E. Baker. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3357, Jan. 1955, 40 p. (TL 570 Un3t)

Other significant parameters were shift of center-of-gravity, sweepback, and increase of section thickness ratio. Tables, graphs, diagrams. 13 ref.

6136 Turbulent-Heat-Transfer Measurements at a Mach Number of 2.06. Maurice J. Brevoort and Bernard Rashis. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3374, Mar. 1955, 20 p. (TL570 Un3t)

Measurements using an annular nozzle are in good agreement with V-2 rocket data. Table, diagrams, graphs. 8 ref.

6137 Free-Flight Measurements of Turbulent-Boundary-Layer Skin Friction in the Presence of Severe Aerodynamic Heating at Mach Numbers From 2.8 to 7.0. Simon C. Sommer and Barbara J. Short. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3391, Mar. 1955, 47 p. (TL570 Un3t)

Includes diagrams, tables, graphs, shadowgraphs. 25 ref.

6138 Icing Limit and Wet-Surface Temperature Variation for Two Airfoil Shapes Under Simulated High-Speed Flight Conditions. Willard D. Coles. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3396, Feb. 1955, 33 p. (TL570 Un3t)

Theoretical and experimental study of the heating effect of atmospheric friction on the icing limits of high-speed planes. Photographs, diagrams, graphs. 8 ref.

Books and Miscellaneous Publications

6139 Air Data Components and Systems for Aircraft and Guided Missiles. 26 p. 1954. AiResearch Manufacturing Co., Los Angeles. (TL589 Ai76a)

Operating principles, typical specifications, and performance characteristics.

See also:

6732 (theory of turbulent flow)
6792 (effects of water on turbojet behavior)
7344 (resin-impregnated fabrics for aircraft)

AGRICULTURE

6140 Phosphate Insecticide Research. Rosmarie von Rümker. *Agricultural Chemicals*, v. 10, Mar. 1955, p. 41-43, 131, 133.

Mechanism of action of organic phosphoric esters on mammals and insects. Outline of systemic pest control. Diagrams, tables. 13 ref.

6141 Significance of Water Solubility on Phosphatic Fertilizers. John R. Webb. *Agricultural Chemicals*, v. 10, Mar. 1955, p. 44-46.

Recent results of field and laboratory tests. Tables, photograph.

6142* Action of Granulated Fertilizers on the Microflora of Soil and on the Yield of Wheat. **Deistvie granulirovannykh udobrenii na mikrofloru pochvy i na urozhai pshenitsy.** (Russian.) L. D. Tikhomirova. *Agrobiologiia*, 1954, no. 6, Nov.-Dec., p. 76-85.

Use of superphosphates; effect of moisture; frequency of fertilizer applications; bacteria count. Diagrams, tables. 10 ref.

6143* Root Feeding and Some Problems of Plant Protection. **Kornevoe pitanie i nekotorye voprosy zashchity rastenii.** (Russian.) M. V. Gorlenko. *Agrobiologiia*, 1954, no. 6, Nov.-Dec., p. 86-90.

Fungus control and use of antibiotics. 14 ref.

6144* The Effects of Aldrin on Soil Microorganisms and Some of Their Activities Related to Soil Fertility. Donald W. Fletcher and Walter B. Bollen. *Applied Microbiology*, v. 2, Nov. 1954, p. 349-354.

Concentrations recommended for insect control have little effect on soil fertility. Micrograph, graphs, table. 19 ref.

6145* Some Aspects of the Toxicity of 3-(*p*-Chlorophenyl)-1,1-Dimethylurea (CMU) to Plants. E. Levi. *Australian Journal of Agricultural Research*, v. 6, Jan. 1955, p. 27-32.

A powerful root system plant poison. Table, graphs, photograph.

6146* Evapotranspiration From Wheat and Pasture in Relation to Available Moisture. P. F. Butler and J. A. Prescott. *Australian Journal of Agricultural Research*, v. 6, Jan. 1955, p. 52-61.

Soil moisture to 5 ft. is determined under heat, stubble, pasture, and follow over a 3 yr. period. Tables, graphs. 11 ref.

6147* The Use of Heaters for Frost Prevention in a Pineapple Plantation. D. E. Angus. *Australian Journal of Agricultural Research*, v. 6, Jan. 1955, p. 186-195.

Effects of no. and distribution of heaters fit to land contours. Map, graphs, table, diagrams. 3 ref.

6148* The Relationship of Soil Phosphorus Tests to Crop Yield and to the Requirement of the Tomato for Phosphatic

Agriculture

Fertilizer. H. B. Heeney, R. F. Bishop, and H. Hill. *Canadian Journal of Agricultural Science,* v. 35, Jan.-Feb. 1955, p. 11-18.
Field and laboratory investigations to establish correlation tables between P soil test values and crop response to phosphatic fertilizer. Tables, graphs. 8 ref.

6149* Toxicities of Various Insecticides to Cucumber. D. G. Harcourt and L. M. Cass. *Canadian Journal of Agricultural Science,* v. 35, Jan.-Feb. 1955, p. 19-26.
Field experiments. Tables. 16 ref.

6150* Factors Affecting the Laboratory Evaluation of Soil Conditioners. F. J. Brockman and O. C. W. Allenby. *Canadian Journal of Agricultural Science,* v. 35, Jan.-Feb. 1955, p. 27-35.
Determination of the degree of stability of conditioned aggregates when exposed to the slaking action of water. Graphs, tables. 3 ref.

6151* The Use of Anion-Exchange Resins in Phosphorus Fertility Studies. R. W. Sheard and A. G. Caldwell. *Canadian Journal of Agricultural Science,* v. 35, Jan.-Feb. 1955, p. 36-41.
Determination of the P-supplying power of soils. Tables. 10 ref.

6152* The Effects of Two Soil Conditioners on Some Physical Properties of a Brookston Clay Soil. E. F. Bolton, J. M. Fulton, and J. W. Aylesworth. *Canadian Journal of Agricultural Science,* v. 35, Jan.-Feb. 1955, p. 51-57.
Includes tables. 14 ref.

6153* The Use of Desiccants for the Pre-Harvest Treatment of Legume Seed Crops. R. M. MacVicar and D. R. Gibson. *Canadian Journal of Agricultural Science,* v. 35, Jan.-Feb. 1955, p. 83-90.
Small plot and field trials. Tables. 7 ref.

6154 Plant Cytology and the Electron Microscope. A. Frey-Wyssling. *Endeavour,* v. 14, Jan. 1955, p. 34-39.
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Includes tables. 4 ref.

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Includes photographs.

6178* Influence of Different Types of Nitrogen Fertilizers on the Yield of Cotton. **Vliianie razlichnykh form azotnykh udobrenii na urozhai khlopchatnika.** (Russian.) E. A. Zhorikov. *Zemledelie*, v. 3, no. 1, Jan. 1955, p. 62-67.

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A comprehensive survey of engineering elements of agricultural processing which can contribute towards increasing the value of basic farm products.

6180 Soil and Fertilizer Phosphorus in Crop Nutrition. W. H. Pierre and A. G. Norman, editors. v. IV of Agronomy Series of Monographs. 492 p. 1953. Academic Press, New York. (S647 P61s)

Contributions by 29 authors on present knowledge of requirements of crops and availability of P under various conditions.

See also:

6192 (photosynthesis in algae)
6276 (soil analysis)
6352 (pesticides and antibiotics)
6397 (chemistry of hop constituents)
6581 (corrosion by agricultural chemicals)

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6181* Purification of Bacitracin Polypeptides by Charcoal Chromatography and Zone Electrophoresis. (English.) Jerker Porath. *Acta Chemica Scandinavica*, v. 8, no. 10, 1954, p. 1813-1826.

Experimental conditions established for separation of peptides, nucleotides, and amino acids. Diagrams, table, graphs, chromatograms, ultra-violet spectra. 16 ref.

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Formula $C_{66}H_{102}O_{16}N_{17}S$ assigned. Table. 11 ref.

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Hydrolized with HCl. Tables, chromatographic scheme. 26 ref.

6185* Feasibility of Biological Warfare Against Public Water Supplies. Bernard B. Berger and Albert H. Stevenson. *American Water Works Association, Journal*, v. 47, Feb. 1955, p. 101-110.

Possibilities and protective measures are discussed. Tables. 20 ref.

6186 Microbiological Assay on Large Plates. I. General Considerations With Particular Reference to Routine Assay. II. Precise Assay. K. A. Lees and J. P. R. Tootill. *Analyst*, v. 80, Feb. 1955, p. 95-123.

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Effects of lengthening alkyl side chains and increasing no. of Cl atoms on biological activities. Graphs, tables. 31 ref.

6189* Biosynthesis of Chlorophyll, Atropine, Glucose, and Albumins Containing Tagged Carbon. **Biosintez khlorofilla, atropina, gliukozy i belkov, soderzhashchikh mechenyi uglerod.** (Russian.) V. I. Merenova. *Biokhimiia*, v. 19, no. 6, Nov.-Dec. 1954, p. 698-701.

Experimental equipment and data. Diagram, table, flow chart. 3 ref.

6190* Mechanism of Antibiotic Action. **O mekhanizme deistviia antibiotikov. II.** Specific Action of *d*-Chloramphenicol on the Development of Some Seedling Plants. **Spetsificheskoe deistvie *d*-khloramfenikola na razvitie rostkov rastenii.** (Russian.) F. Šorm, M. Zelinková, and Z. Šormová. *Collection of Czechoslovak Chemical Communications*, v. 19, no. 6, Dec. 1954, p. 1324-1329.

Seeds with different reserves of protein, starch, and oil gave different responses to the inhibitory effect. Graphs. 9 ref.

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6193* Absorption of Carbon Dioxide by the Application of Carbonic Anhydrase. II. Effect of Enzyme on the Rate of Absorption of Carbon Dioxide by Magnesium Oxide. III. Effect of Enzyme on the Rate of Absorption of Carbon Dioxide by Magnesium Oxide Under Pressure. IV. Effect of Enzyme on the Rate of Absorption of Carbon Dioxide of Sodium Carbonate Under Pressure. (English.) Kin'ichi Uchigasaki, Shigeo Yokozeni, and Tatsuro Toriumi. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 6, no. 4, Aug. 1954, p. 396-410.

Includes diagrams, tables, graphs. 12 ref.

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6194 Amino Acid Metabolism. William D. McElroy and H. Bentley Glass, editors. 1048 p. 1955. John Hopkins Press, Baltimore. (QP801.A5 M45s)

Contains 58 papers covering general considerations and behaviors of individual compounds.

6195 Natural Plant Hydrocolloids. 103 p. 1954. American Chemical Society, Washington, D. C. (QK865 Am35n)

Reviews and reports of original research on natural hydrocolloids which are of appreciable commercial significance.

See also:

6144 (effects of aldrin on soil microorganisms)
6165 (effects of growing plants on soil bacteria)
6174 (relation between phosphates and photosynthesis)
6285 (Co in biological materials)
6355 (anthelmintic activity of thionocarbanilates)
6447 (biochemistry of nucleic acids)
6773 (action of sulfate-reducing bacteria on petroleum-bearing materials)
7263 (biological effects and uses of radiation)

CERAMICS AND CONCRETE

6196 Aging of the Properties of Barium Titanate and Related Ferroelectric Ceramics. W. P. Mason. *Acoustical Society of America, Journal*, v. 27, Jan. 1955, p. 73-85.

Aging is caused by reduction of effective polarization due to motion of domain walls. Graphs, tables, diagrams, micrograph. 14 ref.

6197 The Refractoriness of Some Types of Quartz and Quartzite. I. (English.) Folke Sandford and Stig Fransson. *Acta Polytechnica (Chemistry Series)*, v. 4, no. 3, 1954, 27 p. (T1 Ac81)

Compressive melting technique for high-viscosity refractories. Diagram, tables, graphs, phase diagram. 15 ref.

6198 Sintering of Refractory Powders. Paul Schwarzkopf. *American Ceramic Society Bulletin*, v. 34, Feb. 1955, p. 45-47. Mechanism and theory. Diagrams, table. 7 ref.

6199 The Extrusion Problem. Edward Meeka. *American Ceramic Society Bulletin*, v. 34, Feb. 1955, p. 51-54.

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Studies to obtain stabilized zirconia and to establish phase relationships. Graphs, tables. 6 ref.

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Includes graphs, tables, photograph. 22 ref.

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6204* Simplified Method for the Determination of Apparent Surface Area of Concrete Products. L. F. Gleysteen and G. L. Kalousek. *American Concrete Institute, Journal*, v. 26, Jan. 1955; *ACI Proceedings*, v. 51, 1955, p. 437-446.

Includes photograph, tables, graph. 6 ref.

6205* Comparison of Results of Three Methods for Determining Young's Modulus of Elasticity of Concrete. R. E. Philleo. *American Concrete Institute, Journal*, v. 26, Jan. 1955; *ACI Proceedings*, v. 51, 1955, p. 461-469.

Includes graphs, tables. 17 ref.

6206* Prestressed Concrete Tanks at East Bay. J. W. Trahern. *American Waterworks Association, Journal*, v. 47, Feb. 1955, p. 186-194.

Design and construction details of several tanks over recent yr. Photographs.

6207* Measuring the Electromotive Forces at 1500 C and Radiographic Investigations in the System Magnesium Oxide-Aluminum Oxide. **Messung der elektromotorischen Kräfte bei 1500° und Röntgenuntersuchungen im System Magnesiumoxyd-Aluminiumoxyd.** (German.) Wilhelm Anton Fischer and Alfred Hoffmann. *Archiv für das Eisenhüttenwesen*, v. 26, no. 2, Feb. 1955, p. 63-70.

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Disadvantages of gravimetric, electric, and optical methods; recommendation of an indirect method. Graphs, micrograph, diagram. 13 ref.

6209* The Importance of Ceramic Tubes From the Standpoint of Hygiene and Economy. **Die Bedeutung des Steinzeugrohres in hygienischer und wirtschaftlicher Beziehung.** (German.) Erich Koschare. *Bitumen, Teere, Asphalte, Peche*, v. 6, no. 1, Jan. 1955, p. 33-34.

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6210 Practical Aspects of Silicon Carbide Wear-Resistant Linings. R. E. Wolfensperger. *Blast Furnace and Steel Plant*, v. 43, Mar. 1955, p. 310-314.

Refractories for wear-resistant applications. Photographs, diagram.

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6213 The Properties of Calcined Alumina. I. The Behaviour of Alumina Hydrates During Calcination. II. The Behaviour of Calcined Alumina During Fine Grinding. T. G. Carruthers and R. M. Gill. *British Ceramic Society, Transactions*, v. 54, Feb. 1955, p. 59-82.

Includes graphs, micrographs, tables. 14 ref.

6214 Sintering and Reactivity of Solids. J. Arvid Hedvall. *Ceramic Age*, v. 65, sec. 1, Feb. 1955, p. 13-17.

Surface activity of powders; recrystallization processes. Diagrams, graphs, photographs. 13 ref.

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Variation of thermal efficiency with temperature is utilized to estimate fuel required for different temperature levels in a glass furnace. Tables, graph, diagrams. (To be continued.)

6216 Jets, Reactors, Missiles Need Ceramic Parts. G. M. Butler, Jr. *Ceramic Industry*, v. 64, Mar. 1955, p. 70-72, 74, 101.

Applications and properties of ceramic coatings and cermets. Photographs, diagrams.

6217* Refractories for the Steel Industry. II. *Ceramics*, v. 6, Jan. 1955, p. 488-494.

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6218* The Use of the Noble Metals in the Ceramics Industries. *Ceramics*, v. 6, Feb. 1955, p. 536-539.

Use of Au, Pt, and Ag for decorative purposes, for application to electro ceramics, and in pyrometers. Table.

6219* Specific Heat of Glass as a Function of the Temperature. **Étude de la chaleur spécifique des verres en fonction de la température.** (French.) Micheline Prod'homme. *Comptes rendus*, v. 240, no. 2, Jan. 10, 1955, p. 180-181.

Study by differential thermal analysis, of a series of Si glasses, between 100 C and the softening point. Graph. 6 ref.

6220* Ferroelectric Ceramics With Strongly Non-Linear Properties. **Segnetokeramika s rezko vyrazhennymi nelineinymi svoistvami.** (Russian.) T. N. Verbitskaia. *Doklady Akademii Nauk SSSR*, v. 100, no. 1, Jan. 1, 1955, p. 29-32.

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6221 Research on Utilization of Spinel With Lower Valent Aluminum Ion as a Reducing Reagent for Glass. Megumi Tashiro. *Glass Industry*, v. 36, Feb. 1955, p. 83-84, 106. (Translated from *Bulletin of the Chemical Society of Japan*, v. 23, 1952, p. 90.)

Includes tables, graphs.

6222* Structure of Sodium Borosilicate Glasses in Connection With the Phenomenon of Opalescence Communication. **O strukture natrievoborosilikatnykh stekol v sviazi s iavleniem opalestsentsii. I.** Investigation of Opalescence of Glasses. **Issledovanie Opalestsentsii stekol.** (Russian.) D. I. Levin, S. P. Zhdanov, and E. A. Porai-Koshits. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1955, no. 1, Jan.-Feb., p. 31-39.

Experimental data on relation of light scattering intensity and depolarization to temperature. Graphs. 14 ref.

6223* Review of Refractory Products Manufactured in the Electric Furnace. **Revue des produits réfractaires fabriqués au four électrique.** (French.) Arturo Paoloni. *Journal du Four Electrique*, v. 64, no. 1, Jan.-Feb. 1955, p. 23-26.

Production of zirconium silicate, spinels, alumina cement, and electro-graphite.

6224 The System Lime-Water at 21° C and High Pressures. Charles E. Weir. *Journal of Research, National Bureau of Standards*, v. 54, Jan. 1955, p. 37-40.

Discontinuity at 2,800 atmospheres indicates $Ca(OH)_2$-nH_2O, were n is between 4 and 6. Tables, graphs, phase diagram. 7 ref.

6225* On the Constitution of Zinc-Ferrite. (English.) Isao Kushima and Tsuyoshi Amanuma. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 16, no. 4, Oct. 1954, p. 191-204.

Electrical properties, X-ray diffraction data, and chemical analyses of nearly 80 compositions. Tables, diagram, graphs, refractograms. 9 ref.

6226 Glass-to-Metal Hermetically Sealed Terminals. Andrew Wyzenbeek. *Product Engineering*, v. 26, Feb. 1955, p. 180-186.

Designs for performance, size, flexibility, simplicity, and economy. Table, photographs, diagrams.

6227* The Properties of Natural Sillimanite—Its Use in the Manufacture of High Alumina Refractories and the Resulting Applications. M. C. Thomas and M. R. Fourneau. *Refractories Journal*, v. 31, Jan. 1955, p. 2-8.

Includes tables. 9 ref.

6228* Use of Gas Suspensions in Calcining Cement Clinkers. **Obzhig tsementnogo klinkera vo vzveshennom sloe.** (Russian.) E. I. Khodorov and V. M. Kosareva. *Tsement*, v. 21, no. 1, Jan.-Feb. 1955, p. 9-14.

Describes equipment and method for using gas in combination with raw mixture to provide right consistency and flow. Graphs, table, diagrams.

6229* Effect of Temperature on Variations in Viscosity of Portland Cement Slurry. **Vliianie Temperatury na izmenenie viazkosti portlandtsementnogo shlama.** (Russian.) I. Ia. Piven'. *Tsement*, v. 21, no. 1, Jan.-Feb. 1955, p. 21-24.

Moisture of various suspensions; comparison of chalk, clay, and factory slurry suspensions. Graphs, table.

6230* Glass Has a "Soft" Surface. Investigations With the Electron Microscope. **Glas hat eine "weiche" Oberfläche. Untersuchungen im Elektronenmikroskop.** (German.) E. Brüche. *Umschau in Wissenschaft und Technik*, v. 55, no. 5, Mar. 1, 1955, p. 140-142.

Microscopic pressure conditions; polishing; hardness measurements. Micrographs. 4 ref.

6231* Critical Range of Temperatures for Boron Oxide According to the Data of Thermal Capacities, and Glass-Forming Borates. **Kriticheskaia oblast' temperatur u okisi bora po dannym teploemkostei i stekloobrazuiushchie boraty.** (Russian.) R. L. Miuller. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2170-2177.

Includes tables, graphs. 18 ref.

6232* Viscosity of Some Glasses in the Softening and Fritting Temperature Range. **Viazkost' nekotorykh stekol v intervale temperatur razmiagcheniia i otzhiga. I.** (Russian.) B. A. Pospelov. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2178-2184.

Influence of chemical treatment and other factors. Tables, graph, diagrams. 4 ref.

See also:

6489 (sintering of MgO)
6531 (rhombohedral graphite)
6558 (paint vs. porcelain)
6561 (solution ceramic coatings)
6586 (application of carbon and graphite)
6726 (glass industry survey)
6820 (measurement of gloss)
6911 (refractories for iron and steel industry)
6936 (grinding and polishing practices)
7035 (melting points of metal oxides)
7239 (neutron damage in vitreous silica)
7268 (quality control in pottery manufacture)

CHEMICAL ENGINEERING

6233* The Production of 2,3-Butanediol by Fermentation of Sugar Beet Molasses. Keith B. McCall and Carl E. Georgi. *Applied Microbiology*, v. 2, Nov. 1954, p. 355-359.

Factors influencing rate and efficiency of fermentation. Graphs, tables. 19 ref.

6234 Kinetic Theory of Evaporation Rates of Liquids. Eric F. Lype. *ASME, Transactions*, v. 77, Feb. 1955, p. 211-219; disc., p. 219-223.

Calculations based on the Polanyi-Wigner theory. Graphs. 38 ref.

Chemical Engineering

6235* The True Nature of Coal-Tar Pitch. **Die wahre Natur des Steinkohlenteerpechs.** (German.) Heinz-Gerhard Franck. *Brennstoff-Chemie*, v. 36, nos. 1-2, Jan. 1955, p. 12-20.

Shows that pitch is composed of a no. of similar components, 90% of which are aromatics with mol. wt. ranging from 170 to 380; the rest are higher-molecular, soot-like compounds which can be neither dissolved nor distilled. The bonding properties of pitch are explained. Graphs, tables. 11 ref.

6236 To Figure Condenser Costs. *Chemical Engineering*, v. 62, Mar. 1955, p. 116, 118.

Preliminary estimates. Graphs.

6237 Heat Transfer Performance Curves. Irving Granet. *Chemical Engineering*, v. 62, Mar. 1955, p. 187-190.

Heat exchange problems. Graphs. 7 ref.

6238 Chemical Engineering Fundamentals. Catalytic Vapor Phase Reactions. III. Thomas E. Corrigan. *Chemical Engineering*, v. 62, Mar. 1955, p. 197-200.

Deviation and expression of kinetic data. Photograph, graphs. 4 ref.

6239 Azeotropic Distillation. *Chemical Engineering*, v. 62, Mar. 1955, p. 304-307.

In separation of "middle distillates". Photographs, flowsheet.

6240 New Process Increases Sulfuric Acid Capacity. *Chemical Engineering Progress*, v. 51, Feb. 1955, p. 96.

Cominco SO_3 recovery increases capacity 20%. Flow diagram.

6241 Solving Conductive Heat Transfer Problems With Electrical-Analogue Shape Factors. Robert V. Andrews. *Chemical Engineering Progress*, v. 51, Feb. 1955, p. 67F-71F.

Ohm's law, Fourier's law, and Langmuir's shape factor used to extend practical solution of heat transfer problems. Diagrams, graph. 16 ref.

6242 Interfacial Area in Liquid-Liquid and Gas-Liquid Agitation. Theodore Vermeulen, Gael M. Williams, and Gordon E. Langlois. *Chemical Engineering Progress*, v. 51, Feb. 1955, p. 85F-94F.

Photoelectric cell measures effectiveness of mixing. Tables, graphs, diagrams, photographs. 21 ref.

6243 On the Steady State Fractionation of Multicomponent and Complex Mixtures in an Ideal Cascade. I. Analytic Solution of the Equations for General Mixtures. Andreas Acrivos and Neal R. Amundson. *Chemical Engineering Science*, v. 4, Feb. 1955, p. 29-38.

Includes diagram, graph. 10 ref.

6244 An Analysis of the Principles of Batch and Continuous Operation. A. Klinkenberg. *Chemical Engineering Science*, v. 4, Feb. 1955, p. 39-47.

Studies of transfer and other chemical processes. 20 ref.

6245* Crystallizers. **Kristallisatoren.** (German.) Günther Matz. *Chemie-Ingenieur-Technik*, v. 27, no. 1, Jan. 1955, p. 18-22.

Cooling, evaporation, and vacuum crystallizers as representative design types; application range and capacity of equipment. Diagrams. 20 ref.

6246* Rectification With a Chemical Reaction. I. Calculation of the Number of Theoretical Plates for Continuous Plate Columns. (English.) J. Marek. *Collection of Czechoslovak Chemical Communications*, v. 19, no. 6, Dec. 1954, p. 1055-1073.

Includes diagram, tables, graphs. 13 ref.

6247* Thermodynamic Study of the Autothermal Reforming of Propane. **Etude thermodynamique du reforming autothermique de propane. II.** (French.) Daniel Ringuet. *Flamme et thermique*, v. 8, no. 75, Dec. 1954, p. 13-17.

Calorific power of reformed gas and thermal yield; automatic operation; applications; installation. Graph, diagram.

6248 Unit Operations in Chemical Engineering. *Industrial and Engineering Chemistry*, v. 47, Mar. 1955, pt. 2, p. 501-589.

This tenth annual review consists of 16 papers authored by experts in their fields. Pictorial aids. Heavily referenced.

6249 Fundamentals of Chemical Engineering. *Industrial and Engineering Chemistry*, v. 47, Mar. 1955, pt. 2, p. 591-670.

The third annual review on this subject contains seven papers authored by specialists. Graphic aids. Many references.

6250 Equilibrium and Rate Data for Amine Solutions. J. W. Gailer, F. Goodridge, and D. B. Atkin. *Institution of Chemical Engineers, Transactions*, v. 32, Supplement no. 1, 1954, p. 3-5; disc., p. 27-29. (QC182 Sy68)

Includes tables, graphs. 1 ref.

6251 A New Approach to the Problem of Mass Transfer in the Gas Phase. S. Bakowski. *Institution of Chemical Engineers, Transactions*, v. 32, Supplement no. 1, 1954, p. 37-48; disc., p. 78-83. (QC182 Sy68)

Satisfactory agreement with experimental data for about 1200 runs. Diagram, graphs. 19 ref.

6252 Kinetics of Liquid-Film Process in Gas Absorption. I. Models of the Absorption Process. II. Measurements of Transient Absorption Rates. P. V. Danckwerts and A. M. Kennedy. *Institution of Chemical Engineers, Transactions*, v. 32, Supplement no. 1, 1954, p. 49-59; disc., p. 76-77. (QC182 Sy68)

Includes tables, diagram, graphs. 24 ref.

6253 The "Pall-Ring". Wilhelm Pfannmüller. *Institution of Chemical Engineers, Transactions*, v. 32, Supplement no. 1, 1954, p. 151-154; disc., p. 168-172. (QC182 Sy68)

Advantage of a specially shaped tower packing body; test data and operational results. Photograph, graphs, tables.

6254* Adequate Safety Interlock and Alarm Systems for Chemical Processes. Frederick L. Harbaugh. *ISA Journal*, v. 2, Feb. 1955, p. 45-47.

Components of integrated assemblies for batch and continuous processes; economic limitations. Diagrams.

6255* Continuous Production of Polyethylene on Semi-Industrial Scale. (English.) Shinjiro Kodama, Isoji Taniguchi, Sachio Yuasa, Tadanao Ohta, and Yutaka Terada. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 16, no. 4, Oct. 1954, p. 253-259.

Influence of various operating conditions on yield and product properties during high-pressure gaseous phase polymerization. Diagram, tables, graphs. 2 ref.

6256* Azeotropic & Extractive Distillation. III. Azeotropic Processes. G. A. Dummett. *Petroleum*, v. 18, Feb. 1955, p. 41-45, 49.

Typical examples are analyzed in order to demonstrate the power and versatility of these techniques. Diagrams, tables.

6257 Making Aldehydes From Petroleum. II. Peter W. Sherwood. *Petroleum Refiner*, v. 34, Feb. 1955, p. 129-135.

Detailed description of the Oxo process, aldolization, aldol conversion, and partial oxidation. Diagrams, photograph. 19 ref.

6258* Material Problems in High-Pressure Apparatus of the Chemical Industry. **Werkstoff-Fragen bei Hochdruckapparaturen der chemischen Industrie.** (German.) I. Class. *VDI Zeitschrift*, v. 97, no. 2, Jan. 11, 1955, p. 33-41.

Considerations of strength properties and resistance to corroding and other influences of chemicals on materials used in the high-pressure equipment. Photographs, diagrams, graphs, tables, micrographs. 8 ref.

6259* Mass Transfer Through the Liquid Phase During Bubbling on a Filter Plate. **Massoperedacha cherez zhidkuiu fazu pri barbotazhe na sitchatoi tarelke.** (Russian.) I. N. Kuz'minykh and Zh. A. Koval'. *Zhurnal Prikladnoi Khimii*, v. 28, no. 1, Jan. 1955, p. 21-29.

Relation of height of foam, static pressure, and plate resistance to the rate of air for aqueous solutions of glycerin. Diagrams, graphs. 8 ref.

Books and Miscellaneous Publications

6260 Chemical Process Principles. Pt. I. Material and Energy Balances. Olaf A. Hougen, Kenneth M. Watson, and Roland A. Ragatz. 2nd Ed. 504 p. 1954. John Wiley & Sons, New York. (TP155 H81c2)

A fundamental text on the application of physical and chemical principles to industrial problems; efficient use of pilot plant data.

6261 Atomization and Spray Drying. W. R. Marshall, Jr. Chemical Engineering Progress Monograph Series, No. 2, v. L, 122 p. 1954. American Institute of Chemical Engineers, New York. (TP363 M35a)

Capacity characteristics, spray distribution, and power requirements; drop-size-distribution data and characteristics; droplet evaporation; spray-dried products, dryer design, performance, and costs.

6262 Manual on Industrial Water. ASTM Special Technical Publications No. 148-A. 2nd Rev. Ed. 420 p. 1954. American Society for Testing Materials, Philadelphia. (TD353 Am35m2)

New and revised methods regarding uses, composition, treatment, analysis, and deposits.

See also:

6376 (coking by-product yield)
6387 (hydrocarbon conversion by explosion)
6486 (generalized activity coefficients for hydrocarbons)
6719 (prices of chemicals)
6745 (recovery of chemicals from coal)
6830 (flow meters and controls)
6864 (high vacuum in industry)

CHEMISTRY—ANALYTICAL AND INORGANIC

6263 Reactions of Some Alkali and Alkaline Earth Metals With Aluminum(III) Iodide in Liquid Ammonia. William Lloyd Taylor, Ernest Griswold, and Jacob Kleinberg. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 294-298.

The compound $Al_{1.0}(NH_2)_{1.5}I_{1.5}$ is believed to form. Tables. 14 ref.

6264 The Vaporization of TiN and ZrN. Michael Hoch, David P. Dingledy, and Herrick L. Johnston. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 304-306.

Vaporization and decomposition from 1987 to 2466 K. Tables. 11 ref.

6265 Miscibility of Liquid Metals With Salts. I. The Sodium Halide Systems. M. A. Bredig, J. W. Johnson, and Wm. T. Smith, Jr. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 307-312.

Studied to about 1050 C. Tables, graphs, diagrams. 14 ref.

6266 The Reaction of Thorium Nitrate Tetrahydrate With Nitrogen Oxides. Anhydrous Thorium Nitrate. John R. Ferraro, Leonard I. Katzin, and George Gibson. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 327-329.

Thermal decomposition of $Th(NO_3)_4 \cdot 2N_2O_5$. Table, graph. 18 ref.

6267 The Reaction of Lithium Amide With Diborane. George W. Schaeffer and Louis J. Basile. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 331-332.

Includes tables. 8 ref.

6268 Recent Advances in Fluorescence Analysis Instrumentation. D. C. Miller. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint*, 1954, 7 p. (TN706 EL25p)

Equipment and techniques for nondestructive analysis. Graphs.

6269 Analysis of Stainless Steels by X-Ray Fluorescence. M. F. Hasler and J. Rittenhouse. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint*, 1954, 9 p. (TN706 EL25p)

Includes photographs, graphs, table. 5 ref.

6270 Qualitative and Quantitative Analysis of Mixtures of Surface-Active Agents With Special Reference to Synthetic Detergents. C. Kortland and H. F. Dammers. *American Oil Chemists' Society, Journal*, v. 32, Feb. 1955, p. 58-64.

Scheme depends on acid resistance of different types. Table, diagrams. 13 ref.

6271 The Infrared Spectra of Mono-, Di-, and Triglycerides. Robert T. O'Connor, Elsie F. DuPre, and R. O. Feuge. *American Oil Chemists' Society, Journal*, v. 32, Feb. 1955, p. 88-93.

Spectra from to 12μ for several saturates and unsaturates. Infra-red spectra, tables. 26 ref.

6272 The Separation of Zinc From Cadmium. E. R. Baggott and R. G. W. Willcocks. *Analyst*, v. 80, Jan. 1955, p. 53-64.

Cadmium and Zn can be separated by passing a mixture of their sulfates in mixed sulfate-iodide solution through an anion-exchange column. Graphs, tables. 9 ref.

6273 The Determination of Dissociation Constants of Dibasic Acids. H. Irving, H. S. Rossotti, and G. Harris. *Analyst*, v. 80, Feb. 1955, p. 83-94.

Critical review of existing methods for determining the Brønsted dissociation constants. Graphs, tables. 26 ref.

6274 Isotope-Dilution Technique for Determining Benzylpenicillin in Fermentation Liquors. G. C. Ashton and M. C. Foster. *Analyst*, v. 80, Feb. 1955, p. 123-132.

Analysis based upon determination of phenylacetyl grouping. Tables. 15 ref.

6275 Analytical Applications of the Barker Square-Wave Polarograph. D. J. Ferrett and G. W. C. Milner. *Analyst*, v. 80, Feb. 1955, p. 132-140.

Application of the Barker square-wave polarograph; and advantages of this new technique over conventional polarography. Diagram, graphs. 6 ref.

6276 The Determination of Nitrate and Nitrite in Soil. J. Buckett, W. D. Duffield, and R. F. Milton. *Analyst*, v. 80, Feb. 1955, p. 141-145.

Critical investigation of the various methods for determining the small quantities of nitrate present in soils. Tables. 13 ref.

6277 Determination of Iodine in Common Salt by the Catalytic Reduction of Ceric Ions. M. Dubravčić. *Analyst*, v. 80, Feb. 1955, p. 146-153.

Includes tables, graphs. 9 ref.

6278 Separation and Analysis of Gases and Volatile Liquids by Gas Chromatography. H. W. Patton, J. S. Lewis, and W. I. Kaye. *Analytical Chemistry*, v. 27, Feb. 1955, p. 170-174.

Fractions eluted from normal adsorbents with H, N, or CO_2. Diagrams, graphs, chromatograms. 19 ref.

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Details of apparatus for operation at 0.01 to 0.1 mm. Hg. Diagrams, graphs, photograph. 13 ref.

6280 Paper Chromatographic Separation of Metal 2-Thenoyltrifluoroacetone Chelates. Eugene W. Berg and Russell T. McIntyre. *Analytical Chemistry*, v. 27, Feb. 1955, p. 195-198.

Chelates of Fe(III), Cu(II), Ni(II), Co(II), and Mn(II). Tables, graphs, ultra-violet spectra. 4 ref.

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Modification of ASTM D 855/46T method. Tables, flowsheet. 25 ref.

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Coprecipitated As, Ge, and Si are volatilized with HF, HCl, and HBr prior to phosphate determination. Tables, graphs, ultra-violet spectra. 8 ref.

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The 1-nitroso-2-naphthol complex of Co is extracted with $CHCl_3$. Tables, graph. 20 ref.

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6287* Microanalytical Method of Determining B in Coal. **Mikroanalytische Methode zur Bestimmung von Bor in Kohle.** (German.) F. H. Kunstmann and J. F. Harris. *Brennstoff-Chemie*, v. 36, nos. 1-2, Jan. 1955, p. 20-23.

Quantitative analytical distillation process of separating B as methyl borate. Tables, diagrams. 24 ref.

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Laboratory equipment and procedures for rapid wet analysis. Diagrams, graphs. 14 ref.

6289 On the Determination of Small Boron Contents in Steel. H. Blum and A. Eder. *Henry Brutcher Translation No.* 3434, 15 p. (Slightly abridged from *Radex Rundschau*, 1954, nos. 3-4, p. 123-132.) Henry Brutcher, Altadena, Calif.

Methods for wet and spectrographic analysis. Tables, photographs, graphs. 17 ref.

6290 Colorimetric Determination of Iron in Hard Chromium Plating Solutions. H. Pohl. *Henry Brutcher Translation No.* 3442, 5 p. (From *Metalloberfläche*, v. 6, no. 9, 1954, p. B129-B130.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 516, v. 4, Jan. 1955.

6291* Direct Polarographic Determination of Aliphatic Nitrated Derivatives in the Presence of Lanthanum or Cerium Salts. **Dosage polarographique direct des dérivés nitrés aliphatiques en présence de sels lanthane ou de cérium.** (French.) Robert Miquel and Alexandre Condylis. *Bulletin de la société chimique de France*, 1955, no. 2, Feb., p. 236-239.

Includes graphs, tables. 5 ref.

6292 Photometric Methods of Analysis. *Chemical Age*, v. 72, Feb. 26, 1955, p. 527-534, 542.

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Reviews kinetic studies of inorganic reactions. Tables, diagrams. 84 ref.

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6296* The Oxidation of Hydrazine With Selenic Acid. **Die Oxydation von Hydrazin mit Seleniger Säure.** (German.) B. Suseela. *Chemische Berichte*, v. 88, no. 1, 1955, p. 23-25.

New method of determining hydrazine based on oxidation, liberation of N, and precipitation of metallic Se. Table. 15 ref.

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6298* **Thioacetamide in Analytical Chemistry.** H. Flaschka. *Chemist-Analyst*, v. 44, Mar. 1955, p. 2-7.

A review. Table. 16 ref.

6299* Complexometric Titrations (Chelatometry.) **Komplexometrische Titrationen (Chelatometrie). VII.** Pyrocatechol Violet, a New Specific Indicator. Determination of Ni, Co, Mn, Zn, Mg, and Cd. **Brenzcatechinviolett, ein neuer spezifischer Indikator. Die Bestimmung von Nickel, Kobalt, Mangan, Zink, Magnesium und Cadmium. VIII.** Masking of Cations by 2,3-Dimercaptopropanol. **Die Maskierung von Kationen mit 2,3-Dimercaptopropanol. IX.** Problem of Determining Ni in the Presence of Co. **Beitrag zur Bestimmung von Nickel neben Kobalt.** (German.) M. Malát, V. Suk, A. Jeníčková, R. Přibil, and Z. Roubal. *Collection of Czechoslovak Chemical Communications*, v. 19, no. 6, Dec. 1954, p. 1156-1174.

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6301* The Use of Complexon in Quantitative Analysis. **Über die Verwendung von Komplexon in der Massanalyse.** (German.) H. Flaschka. *Fortschritte der chemischen Forschung*, v. 3, no. 2, 1955, p. 253-308.

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Complex formation between metal ions and amino acids under various conditions. Graphs. 6 ref.

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Includes tables. 9 ref.

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Includes tables, graphs. 4 ref.

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Theory describes absorption by pulverized particles in sintered KBr discs. Diagram, graphs. 9 ref.

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Includes tables, diagram. 17 ref.

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Includes diagrams, graphs, tables. 17 ref.

6308* Rapid Determination of Manganese in Metal Alloys. **Schnellbestimmung von Mangan in Metall-Legierungen. II.** Photometric Evaluation of $HClO_4/H_3PO_4$ Method. **Photometrische Auswertung der $HClO_4/H_3PO_4$-Methode.** (German.) H. Schröder. *Metall*, v. 9, nos. 3-4, Feb. 1955, p. 100-102.

Analytical procedure, evaluation of results, and rechecks on ferrous and non-ferrous alloys. Graphs, table. 3 ref.

6309* A Photometric Determination of Copper in Non-Ferrous Metals and Alloys. **Eine photometrische Kupfer-Bestimmung in Ne-Metallen und -Legierungen.** (German.) H. Pohl. *Metall*, v. 9, nos. 3-4, Feb. 1955, p. 102-103.

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Includes table, diagrams. 5 ref.

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Includes graph, structural formulas. 65 ref.

6312* Communications Presented at the Infra-Red Conferences. **Communications présentées aux journées d'études sur l'infrarouge.** Grating Spectrographs Used in the P.C.B. Infra-Red Laboratories. **Spectrographes à réseau utilises au laboratorie d'infrarouge du P.C.B.** Principles of a New Infra-Red Spectrophotometer. **Principes d'un nouveau spectrophotomètre infrarouge.** Comparative Luminosities of Prism and Grating Spectrometers. **Luminosités comparées des spectromètres à prismes et à réseaux.** Optical Apparatus for the Study of Atmospheric Transparency. **Appareillage otique pour l'étude de la transparence atmosphérique.** (French.) Gilbert Amat, Karl Friedrich Luft, Henry Mailiet, Pierre Jacquinot, Albert Arnulf, Jean Bricard, and Claude Veret. *Revue d'optique*, v. 33, no. 12, Dec. 1954, p. 642-664.

Includes photographs, spectra, diagrams, graphs. (To be continued.)

6313* Comparison of Analytical and Spectral Methods of Determining Total Aluminum in Steels. **Comparaison des méthodes analytiques et spectrales du dosage de l'aluminium total dans les aciers.** (French.) M. Lacomble and L. Dor. *Revue universelle des mines*, v. 11, ser. 9, no. 2, Feb. 1955, p. 86-97.

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Principle, characteristics, and uses; comparison with other analytical methods. Diagrams, graphs, photographs, tables, spectra. 72 ref.

6329* Complex Compounds. **Über Komplexverbindungen. XVIII.** Fluoro-Pentammine Salts of Trivalent Chromium. **Fluoro-pentammin-chrom(III)-salze.** (German.) Martin Linhard and Melitta Weigel. *Zeitschrift für anorganische und allgemeine Chemie*, v. 278, nos. 1-2, Jan. 1955, p. 24-32.

Includes table. 6 ref.

Books and Miscellaneous Publications

6330 A Manual of Paper Chromatography and Paper Electrophoresis. Richard J. Block, Emmett L. Durrum, and Gunter Zweig. 484 p. 1955. Academic Press, New York. (QD271 B62p2)

Review of basic principles, recent developments, and methodology permit re-evaluation of existing techniques and point to new applications.

6331 Fuel Testing. Godfrey W. Himus. 3rd Ed. 278 p. 1953. Leonard Hill, London. (TP321 H57f3)

Analysis of coal, coke, gas, solid, and liquid fuels; pyrometry; combustion calculations; selection of coal for industrial uses.

6332* Reagent Chemicals and Standards. Joseph Rosin. 3rd Ed. 561 p. 1955. D. Van Nostrand, New York. (QD77 R73r3)

Properties, tests, and standards for more than 600 substances; preparation directions and uses.

See also:

6186 (microbiological assay)
6477 (analysis of coal tar)
6492 (reactions between H_2O_2 and halide ions)
6495 (separation of rare earth metals)
6496 (ion exchangers in analytical chemistry)
6812 (gas analysis)
6832 (integrating photoelectric scanners)
6898 (reduction of Sm_2O_3 by Ca)
7300 (analysis by nuclear magnetic absorption)
7320 (X-ray diffraction patterns)

CHEMISTRY—ORGANIC

6333* Studies Related to Naturally Occurring Acetylene Compounds. XVII. Four New Polyacetylenes From Garden Varieties of *Coreopsis*. XVIII. The Synthesis of Some Phenylacetylenes Related to *Compositae* Compounds. XIX. The Isolation of 1-Acetoxy-*n*-Trideca-2:10:12-triene-4:6:8-triyne From *Carlina vulgaris* L. XX. A Preliminary Communication on Some Polyacetylenic Pigments From *Compositae* Plants. (English.) Jörgine Stene Sörensen, Nils Andreas Sörensen, Torger Bruun, Lars Skatteböl, Dagny Holme, and Eldbjörg Tuxen Borlaug. *Acta Chemica Scandinavica*, v. 8, no. 10, 1954, p. 1741-1778.

Includes table, spectra. 55 ref.

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Nine compounds made with $AlCl_3$ and $LiAlH_4$. Table. 11 ref.

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Adenosine, guanosine, inosine, and uridine compounds on Dowex-1 formate. Chromatogram. 7 ref.

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Tetrazane, $H_2NNHNHNH_2$, decomposing above −178 C forms from decomposition of hydrazine at 850 C and 0.5 mm. pressure. Tables. 12 ref.

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Includes tables. 2 ref.

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Ethers of the type R-CH=C(R')OR'' used with alkyl and aryl reagents. Tables. 12 ref.

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Reactivity of compounds compared. 11 ref.

6341 The Action of Lithium Hydride and Phenyllithium on Phenylated Chalcones. Robert E. Lutz and Everett H. Rinker, Jr. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 366-369.

Behavior of aluminum isopropoxide, $LiAlH_4$, and phenyllithium are compared. 17 ref.

6342 Absorption Spectra and Chemical Structures. I. Conjugated Polyenes and *p*-Polyphenyls. II. Solvent Effect. III. Effects of Substituents and Structure. IV. Unsaturated Aldehydes, Ketones and Carboxylic Acids. Kenzô Hirayama. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 373-384.

Includes tables, graphs. 30 ref.

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6405* The Slightly Aromatic Nature of 1,3,5-Triazine and Substitution Reactions of Different Derivatives. **Über die wenig aromatische Natur des 1,3,5-Triazins und Umlagerungsreaktionen verschiedener Derivate.** (German.) W. Ruske. *Chemische Technik*, v. 6, no. 12, Dec. 1954, p. 644-647.

Comparison of theoretical and experimental results; properties of compound. Structural formulas. 29 ref.

6406* The Production of Cyclic Thioamides. **Die Herstellung von cyclischen Thioamiden.** (German.) J. Procházka. *Chemische Technik*, v. 7, no. 1, Jan. 1955, p. 19-20.

Method based on the effect of CS_2 on cyclic amides. Structural formulas. 7 ref.

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6408* Thermal Decomposition of Cellulose and of Carboxymethyl Cellulose. **Décomposition thermique des celluloses et des carboxyméthylcelluloses.** (French.) Michel Bouttemy. *Comptes rendus*, v. 240, no. 3, Jan. 17, 1935, p. 304-306.

Comparison of thermal decomposition in air by automatic thermogravimetry. Graphs. 3 ref.

6409* Preparation of Acetylene Hydrocarbons by the Action of Exchangers on the Dihalogenated Derivatives of Aliphatic Hydrocarbons. **Préparation des hydrocarbures acétyléniques par l'action des échangeurs sur les dérivés dihalogénés des hydrocarbures aliphatiques.** (French.) Zafiri Zafiriadis, Pierre Mastagli, and Odile Pierre. *Comptes rendus*, v. 240, no. 4, Jan. 24, 1955, p. 438-440.

Describes method using anion exchangers. 6 ref.

6410* Research on Vinyl Grignard Reagents. **Recherches sur les magnésiens vinyliques. IV.** Synthesis of β-Ethylene Alcohols. **Synthèse d'alcools β-éthyléniques.** (French.) Henri Normant. *Comptes rendus*, v. 240, no. 4, Jan. 24, 1955, p. 440-442.

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6411* Polarographic Study of Halogenides of the Allyl Type. **Étude polarographique des halogénures du type allylique. II.** Substituted α and β Allyl Bromides. **Bromures d'allyle α et β substitués.** (French.) Micheline Kleine-Peter. *Comptes rendus*, v. 240, no. 5, Jan. 31, 1955, p. 517-519.

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6412* Synthesis of Ketones From Acyl-10 Phenothiazines by Friedel-Crafts Reaction. **Synthèse de cétones à partir d'acyl-10 phénothiazines par réaction de Friedel et Crafts. II.** Comparative Study of Acylation by Friedl-Crafts Reaction and by Reaction of *N*-Methyl Formanilide. **Étude comparée de l'acylation par réaction de Friedel et Crafts et par réaction du *N*-méthyl formanilide.** (French.) Germaine Cauquil and André Casadevall. *Comptes rendus*, v. 240, no. 5, Jan. 31, 1955, p. 538-540.

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6413* Coupling of Monomer or Polymer p-Vinyl Benzene Diazonium Salts With Phenols and Aromatic Amines. **Sur la copulation des sels du p-vinylbenzènediazonium monomère ou polymère avec les phénols et les amines aromatiques. II.** Naphthalene Series. **Série Naphtalénique.** (French.) Modeste Martynoff. *Comptes rendus*, v. 240, no. 5, Jan. 31, 1955, p. 540-543.

Includes graph.

6414* Some New Compounds of the Diphenylmethane Series. **Sur quelques composés nouveaux de la série du diphénylméthane.** (French.) Henry Gault and Mohamed Selim. *Comptes rendus*, v. 240, no. 6, Feb. 7, 1955, p. 630-631.

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6415* Investigation of the Isomerization Reaction of Ethyl Cyclohexane and Tertiary Butyl Cyclohexane Under the Influence of Aluminum Chloride. **Issledovanie reaktsii izomerizatsii etiltsiklogeksana i tret. butiltsiklogeksana pod deistviem khloristogo aliuminiia.** (Russian.) S. D. Mekhtiev. *Doklady Akademii Nauk SSSR*, v. 99, no. 6, Dec. 21, 1954, p. 999-1002.

Includes tables.

6416* Synthesis of Diethyl-4-Nitrophenyl Thiophosphate and Ethyl-4,4′-Dinitrophenyl Thiophosphate Tagged With Radioactive P^{32} and S^{35}. **Sintez dietil-4-nitrofeniltiofosfata i etil-4,4′-dinitrofeniltiofosfata, mechennykh radioaktivnym fosforom P^{32} i seroi S^{35}.** (Russian.) Ia. A. Mandel'baum, I. L. Vladimirova, and N. N. Mel'nikov. *Doklady Akademii Nauk SSSR*, v. 100, no. 1, Jan. 1, 1955, p. 77-79.

Experimental data. 2 ref.

Chemistry—Organic

6417* Cold Flame Mixtures of Acetaldehyde and Oxygen in the Presence of HBr. **Kholodnoe plamia smesei atsetal'degida s kislorodom v prisutstvii HBr.** (Russian.) Z. K. Maizus and N. M. Emanuel'. *Doklady Akademii Nauk SSSR*, v. 100, no. 1, Jan. 1, 1955, p. 115-118.

Includes graph. 5 ref.

6418* Chain Mechanism of the Condensation Reaction of Silicon Tetrachloride With Cyclohexane and Benzene in Corona Discharges. **O tsepnom mekhanizme reaktsii kondensatsii chetyrekhkhloristogo kremniia s tsiklogeksanom i benzolom v tikhikh razriadakh.** (Russian.) D. N. Andreev. *Doklady Akademii Nauk SSSR*, v. 100, no. 2, Jan. 11, 1955, p. 263-265.

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6419* Hyperconjugation. **Hyperkonjugation.** (German.) Friedrich Becker. *Fortschritte der chemischen Forschung*, v. 3, no. 2, 1955, p. 187-252.

Influence of mol. properties, chemical reactivity, and equilibrium. Tables, graphs, structural formulas. 141 ref.

6420* Advances in Azulene Chemistry Since 1950. **Fortschritte der Azulenchemie seit 1950.** (German.) Wilhelm Treibs, W. Kirchhof, and W. Ziegenbein. *Fortschritte der chemischen Forschung*, v. 3, no. 2, 1955, p. 334-410.

Includes tables, structural formulas. 186 ref.

6421* Activated Esters. **Über aktivierte Ester. I.** Activated Ester of Hippuric Acid and Its Transformations With Benzylamine. **Aktivierte Ester der Hippursäure und ihre Umsetzungen mit Benzylamin. II.** Synthesis of Activated Esters of Aminoacid Derivatives. **Synthese aktivierter Ester von Aminosäure-Derivaten. III.** Transformation of Activated Esters of Amino Acid and Peptide Derivatives With Amines and Aminoacids Esters. **Umsetzungen aktivierter Ester von Aminosäure- und Peptid-Derivaten mit Aminen und Aminosäureestern.** (German.) R. Schwyzer, M. Feurer, B. Iselin, and H. Kägi. *Helvetica Chimica Acta*, v. 38, no. 1, Feb. 1955, p. 69-91.

Includes tables. 45 ref.

6422* Capacity of Some Carbonic Acid Amides to Form Complexes. **Über das Komplexbildungsvermögen einiger Carbonsäureamide. XXX.** Metal Ions and Biological Effect. **Metallionen und biologische Wirkung.** (German.) A. Weiss, S. Fallab, and H. Erlenmeyer. *Helvetica Chimica Acta*, v. 38, no. 1, Feb. 1955, p. 263-267.

Includes tables, structural formulas. 18 ref.

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Includes table. 11 ref.

6424 Purines. V. The Preparation of Certain 2,9-Substituted Purines and Azapurines. K. L. Dille, M. L. Sutherland, and B. E. Christensen. *Journal of Organic Chemistry*, v. 20, Feb. 1955, p. 171-177.

Sixteen new syntheses and 3-substituted triazolo [*d*] pyrimidines. 11 ref.

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Olefinic and acetylenic acids are converted to their higher homologs. Infra-red spectra. 10 ref.

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A white, waxy solid made from H_2O_2 and lauric acid. Table. 11 ref.

6427 Metalation of Pyrrole, 1-Methylpyrrole, and 1-Phenylpyrrole With *n*-Butyllithium. David A. Shirley, Benjamin H. Gross, and Philip A. Roussel. *Journal of Organic Chemistry*, v. 20, Feb. 1955, p. 225-231.

Part of study of metalation of simple heterocyclic compounds. 27 ref.

6428 The Preparation of Polymerizable Silanes Containing Organometallic Substituents in the Side-Chains. Dietmar Seyferth and Eugene G. Rochow. *Journal of Organic Chemistry*, v. 20, Feb. 1955, p. 250-256.

Fourteen polymerizable silanes are made by Grignard method. Tables. 19 ref.

6429* Addition Reactions of the NN-Double Bond. **Additionsreaktionen der NN-Doppelbindung. I.** The Addition of the Aromatic Side Chain to Azodicarboxylic Ester. **Die Anlagerung der aromatischen Seitenkette an Azodicarbonester. II.** The Chemistry of Several Other Reactions of Azodicarboxylic Ester. **Der Chemismus einiger weiterer Reaktionen des Azodicarbonesters.** (German.) Rolf Huisgen, Franz Jakob, Werner Siegel, and Anton Cadus. *Justus Liebigs, Annalen der Chemie*, v. 590, no. 1, 1954, p. 1-54.

Includes tables, graphs. 131 ref.

6430* Several New Hydrazine Derivatives of Aromatic Aldehydes. **Über einige neue Hydrazinderivate aromatischer Aldehyde.** (German.) Walter Ried and Georg Oertel. *Justus Liebigs, Annalen der Chemie*, v. 590, no. 2, 1954, p. 136-140.

Production of 26 new compounds. 7 ref.

6431* Deposition of 9-Diazofluorine on Olefins. **Die Anlagerung von 9-Diazofluoren an Olefine. VI.** Effect of Substituents on the Chemical Reactivity. **Über den Einfluss von Substituenten auf die chemische Reaktivität.** (German.) Leopold Horner and Eberhard Lingnau. *Justus Liebigs, Annalen der Chemie*, v. 591, nos. 1-2, 1955, p. 21-52.

Includes diagram, graphs, tables. 66 ref.

6432* The Effect of Substituents on Chemical Reactivity. **Über den Einfluss von Substituenten auf die chemische Reaktivität. VIII.** New Alpha Amino Acids by Reacting Azlactones With Grignard Reagents. **Neue α-Aminosäuren durch Umsetzung von Azlaktonen mit Grignard-Verbindungen.** (German.) L. Horner and Helga Schwahn. *Justus Liebigs, Annalen der Chemie*, v. 591, nos. 1-2, 1955, pp. 99-107.

Ultra-violet spectra, preparation, and reactions. Graph, table. 11 ref.

6433* Reduction of Organic Peroxides With Tertiary Phosphines. **Die Reduktion organischer Peroxyde mit tertiären Phosphinen. VI.** Tertiary Phosphine. **Tertiäre Phosphine.** (German.) L. Horner and W. Jurgeleit. *Justus Liebigs, Annalen der Chemie*, v. 591, nos. 1-2, 1955, p. 138-152.

Includes graph. 21 ref.

6434* The Coupling of Aromatic and Aliphatic Diazo Compounds. **Die Kupplung aromatischer mit aliphatischen Diazoverbindungen.** (German.) Rolf Huisgen and Hans-Joachim Koch. *Justus Liebigs, Annalen der Chemie*, v. 591, no. 3, 1955, p. 200-231.

Includes structural formulas, tables, graphs, spectra. 36 ref.

6435* Continuous Production of Tetraethoxysilane in the Gaseous Phase. **A tetraetoxiszilán előállítása gőzfázisban folytonos eljárással.** (Hungarian.) Béla Ráskay and Miklós Nádasy. *Magyar Kémikusok Lapja*, v. 10, no. 1, Jan. 1955, p. 1-4.

Includes tables, graphs, diagram. 5 ref.

6436* Autoxidation of Unsaturated Compounds. **Über die Autoxydation ungesättigter Verbindungen. I.** Spontaneous Autoxidation of Methyl Linoleate. **Die spontane Autoxydation des Linolsäuremethylesters. II.** Catalysis of Autoxidation of Methyl Linoleate by Radical Yielding Initiators. **Die Katalyse der Autoxydation des linolsäuremethylesters durch radikalliefernde Initiatoren. III.** Catalysis of Autoxidation of Methyl Linoleate by Metal Compounds and by Combined Catalyst Systems. **Die Katalyse der Autoxydation des Linolsäuremethylesters durch Metallverbindungen und durch kombinierte Katalysatorsysteme.** (German.) W. Kern and H. Willersinn. *Makromolekulare Chemie*, v. 15, no. 1, 1955, p. 1-59.

Includes graphs, tables, diagram. 87 ref.

6437* Problem of Catalytic Isomerization of Pentamethylene Hydrocarbons. **K voprosu o kataliticheskoi izomerizatsii pentametilenovykh uglevodorodov. III.** Study of the Behavior of N-Amyl Cyclopentane in the Presence of Palladium Asbestos. **Izuchenie povedeniia n-amiltsiklopentana v prisutstvii palladirovannogo asbesta.** (Russian.) E. I. Margolis and L. I. Makarova. *Moskovskogo, Universiteta, Vestnik, Seriia Fiziko-Matematicheskikh i Estestvennykh Nauk*, 1954, no. 12, Dec., p. 79-82.

Investigation in the temperature range 305 to 310 C; preparation of the catalyst. Tables. 7 ref.

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Basic considerations involved in solvent selection; results of laboratory evaluations of higher ketones. Graphs, tables. 3 ref.

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6440* Chemistry of Organic Isocyanates. **Chemie der organische isocyanaten. II.** (Dutch.) E. J. Mouton. *Plastica*, v. 8, no. 2, Feb. 1955, p. 84-87.

Reactions with amines, water, alcohols, phenols, and carboxylic acids; polymerization; physiological properties. Graph, table. 14 ref.

6441* Nitrogen Derivatives of 2-Benzylfluorine and 2-(4'-Methylbenzyl) Fluorine. **Dérives azotés du 2-benzylfluorène et du 2-(4'-méthylbenzyl)fluorène.** (French.) Ng. Ph. Buu-Hoï, René Royer, and Emile Bisagni. *Recueil des travaux chimiques des Pays-Bas*, v. 74, no. 1, Jan. 1955, p. 24-30.

The arylalkylation of fluorine by benzyl and *p*-methylbenzyl chlorides.

6442* On the Reaction of Cinnamyl Alcohol With Formaldehyde. (English.) M. G. J. Beets and H. van Essen. *Recueil des travaux chimiques des Pays-Bas*, v. 74, no. 2, Feb. 1955, p. 98-112.

Structure of two m-dioxane derivatives and a triol isolated from an acid catalyzed reaction. Structural formulas, graphs, table. 3 ref.

6443* Several Physical Properties of Methylsiloxanes. **Über einige physikalische Eigenschaften von Methylsiloxanen.** (German.) M. Joerges-Heyden, H. G. Markgraf, A. Nikuradse, and R. Ulbrich. *Zeitschrift für Naturforschung*, v. 10a, no. 1, Jan. 1955, p. 10-21.

Volume effects, dielectric constants, dipolar moments, Raman spectra, and electrical rupture resistance; reactivity between siloxane and chlorinated hydrocarbons. Graphs, tables, diagrams. 23 ref.

6444* Chemistry of Cuprammonium Solutions of Cellulose. **Khimiia mednoammiachnykh rastvorov tselliulozy. VI.** Alcoholate Atoms of Cu in Cuprammonium Complexes of Cellulose. **Ob alkogoliatnykh atomakh medi v mednoammiachnykh kompleksakh tselliulozy.** (Russian.) S. N. Danilov and M. G. Okun'. *Zhurnal Obshchei Khimii*, v. 24, no. 12, Dec. 1954, p. 2153-2164.

Action of electric current; interaction of the solutions with ions. Table. 17 ref.

6445* Synthesis of the Acetic Ester of 2,7-Dimethyl Octadiene-3,5-diol-2,7 and Its Catalytic Hydrogenation. **Sintez uksusnogo efira 2,7-dimetil-oktadiin-3,5-diola-2,7 i ego kataliticheskoe gidrirovanie.** (Russian.) A. I. Nogaideli and G. M. Gonadze. *Zhurnal Obshchei Khimii*, v. 25, no. 1, Jan. 1955, p. 114-117.
5 ref.

6446* Interaction of Tetramethyl Butyndiol With Ethylene Oxide. **O vzaimodeistvii tetrametilbutindiola s okis'iu etilena.** (Russian.) K. D. Petrov and E. S. Lagucheva. *Zhurnal Prikladnoi Khimii*, v. 28, no. 1, Jan. 1955, p. 111-114.
6 ref.

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6447 The Nucleic Acids; Chemistry and Biology. Erwin Chargaff and J. N. Davidson, editors. v. I. 692 p. 1955. Academic Press, New York. (QD341.A2 C37n)

Collection of currently available information presented by 19 authors.

6448 Semi-Micro Organic Preparations. J. H. Wilkinson. 94 p. 1954. Oliver and Boyd, London. (QD261 W65s)

Illustrates various techniques employed in organic chemistry and the time, cost, and safety factors involved.

6449 Advances in Carbohydrate Chemistry. Melville L. Wolfrom, editor. v. IX. 426 p. 1954. Academic Press, New York. (QD321 A95)

Contributions by ten authors covering theories relating to mechanisms of replacement reactions, alkal-sensitive glycosides, 2-hydroxyglycals, methyl ethers of hexuronic acids, raffinose family of oligosaccharides, conjugates of *d*-glucuronic acid, color of sugar products, carboxy-methyl cellulose, and paper chromatography of carbohydrates and related compounds.

See also:

6183 (composition of bacitracin A)
6184 (hydrolysis of bacitracin A)
6188 (physiological activity of substituted phenols)
6189 (biosynthesis of various compounds)
6235 (properties of coal tar pitch)
6250 (processes in amine solutions)
6270 (analysis of synthetic detergents)
6459 (fluorinated hydrocarbons)
6467 (X-ray and infra-red spectra of fatty acids and acetamides)
6473 (luminescence of dyes)
6477 (analysis of coal tar)
6490 (decomposition of hydrazobenzene)
6511 (tautomeric equilibrium)
6522 (isomerization of 1-octyne)
6768 (oxidation of aromatic hydrocarbons)
7345 (ionic polymerization)
7346 (polymerization of vinyl ethers)
7347 (polymerization of methyl methacrylate)
7355 (polymerization of vinyl chloride)
7385 (crystallization in high polymers)
7389 (polymerization of vinyl acetate)

CHEMISTRY—PHYSICAL

6450 Ultrasonic Absorption in Toluene. Robert T. Beyer. *Acoustical Society of America, Journal*, v. 27, Jan. 1955, p. 1-4.

Data suggests a structural source for the absorption. Graphs. 11 ref.

6451* The Crystal Structure of Selenium Diselenocyanate. (English.) Ola Aksnes and Olav Foss. *Acta Chemica Scandinavica*, v. 8, no. 10, 1954, p. 1787-1795.

Determined by X-ray methods from Patterson and Fourier projections. Tables, Fourier projections. 17 ref.

6452* Studies on the Hydrolysis of Metal Ions. X. The Hydrolysis of the Uranyl Ion, UO_2^{2+}. XI. The Aluminium Ion, Al^{3+}. (English.) Sten Ahrland, Sirkka Hietanen, Lars Gunnar Sillén, Cyrill Brosset, and George Biedermann. *Acta Chemica Scandinavica*, v. 8, no. 10, 1954, p. 1907-1926.

Complexes studied. Table, graphs, diagrams. 25 ref.

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6455 The Thermodynamic Properties and Configuration of Trimethylhydrazine Identification and Correction for a Major Impurity. J. G. Aston, T. P. Zolki, and J. L. Wood.

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American Chemical Society, Journal, v. 77, Jan. 20, 1955, p. 281-284.

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On Dowex-1 resin. Graphs. 10 ref.

6457 A Correlation of Reaction Rates. George S. Hammond. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 334-338.

Proposes, "if two states, as for example, a transition state and an unstable intermediate, occur consecutively during a reaction process and have nearly the same energy content, their interconversion will involve only a small reorganization of the mol. structures." Graphs. 21 ref.

6458 The Effects of Certain Nitro and Related Compounds Upon the Rate of Exchange of Deuterium Gas With Acetic Acid Over Adams Platinum Catalyst. Hilton A. Smith and Edgar L. McDaniel. *American Chemical Society, Journal*, v. 77, Feb. 5, 1955, p. 533-535.

Certain structures accelerate exchange. Tables. 10 ref.

6459 The Dipole Moments and Molecular Structures of Some Highly Fluorinated Hydrocarbons and Ethers. Armand Di Giacomo and Charles P. Smyth. *American Chemical Society, Journal*, v. 77, Feb. 5, 1955, p. 774-777.

Vapor state dielectric constants for CF_3H, CF_3Cl, CF_3Br, CF_3I and others. Tables. 22 ref.

6460 Anion Exchange Studies. XIII. The Alkaline Earths in Citrate Solutions. Frederick Nelson and Kurt A. Kraus. *American Chemical Society, Journal*, v. 77, Feb. 5, 1955, p. 801-804.

Elements can be separated from each other; groups can be isolated. Graphs. 24 ref.

6461 The Barrier Hindering Internal Rotation in Pentafluorochloroethane. J. G. Aston and T. P. Zolki. *American Chemical Society, Journal*, v. 77, Feb. 5, 1955, p. 804-805.

Entropy values. Tables. 3 ref.

6462 Catalytic Decomposition of Hypochlorite Solution by Iridium Compounds. I. The *p*H-Time Relationship. II. Kinetic Studies. Gilbert H. Ayres and Max H. Booth. *American Chemical Society, Journal*, v. 77, Feb. 20, 1955, p. 825-833.

Rapid changes in *p*H are considered. Tables, graphs, diagram. 27 ref.

6463 The Photolysis of Acetaldazine. R. K. Brinton. *American Chemical Society, Journal*, v. 77, Feb. 20, 1955, p. 842-846.

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6464 The Methylamine Complexes of the Rare Earth (III) Chlorides. Alexander I. Popov and Wesley W. Wendlandt. *American Chemical Society, Journal*, v. 77, Feb. 20, 1955, p. 857-859.

Lanthanum, Ce (III), Pr, Nd, Sm, and Gd chlorides studied up to 300 C. Table, diagram. 15 ref.

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Distribution ratios between organic solvents and 4 *M* perchloric acid. Table, graphs. 8 ref.

6466 Bond Angles in Water-Type and Ammonia-Type Molecules and Their Derivatives. R. S. Mulliken. *American Chemical Society, Journal*, v. 77, Feb. 20, 1955, p. 887-891.

Configuration of other structures are compared with NH_3 and H_2O. Tables, diagrams. 19 ref.

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Lauric, myristic, palmitic, and stearic compounds. Tables, infrared spectrograms. 10 ref.

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6469 The Kinetics of the Hydrogenation of Triglycerides. L. J. Swicklik, C. A. Hollingsworth, and B. F. Daubert. *American Oil Chemists' Society, Journal*, v. 32, Feb. 1955, p. 69-73.

High-purity *cis*- and *trans*-triolein are prepared and hydrogenated. Tables, graphs. 21 ref.

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Viscosity used as index of reaction progress. Tables, graphs. 21 ref.

6471* Physical Chemistry of Association and Aggregation Phenomena. **Zur physikalischen Chemie der Assoziations- und Aggregationserscheinungen.** (German.) Robert Wolff. *Angewandte Chemie*, v. 67, no. 3, Feb. 7, 1955, p. 89-107.

Includes graphs, photographs, tables. 73 ref.

6472* Some Techniques of Measuring Impedances in Metric and Decimetric Waves and Their Use in the Study of the Dielectric Properties of Solid and Liquid Substances. Application to the Case of Some Normal Saturated Alcohols. **Sur quelques techniques de mesure d'impédances en ondes métriques et décimétriques et leur utilisation pour l'étude des propriétes diélectriques de substances solides et liquides. Application au cas de quelques alcools saturés normaux.** (French.) André Lebrun. *Annales de physique*, v. 10, 12me Série, Jan.-Feb. 1955, p. 16-70.

Includes diagrams, tables, charts. 74 ref.

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Lengthy study of fluorescence and phosphorescence. Fundamental polarization, theory, and experiments. Diagrams, tables, graphs. 55 ref.

6474* Thermodynamic Analysis of Binary and Multiple Systems. Determination of Components in Mixtures and Compounds From Calorimetric Measurements Alone. **Die thermodynamische Analyse von Zwei- und Mehrstoffsystemen. Bestimmung der Aktivitäten der Komponenten in Gemischen und Gemengen allein aus kalorimetrischen Messungen.** (German.) Willy Oelsen, Eberhard Schürmann, and Gerhard Heynert. *Archiv für das Eisenhüttenwesen*, v. 26, no. 1, Jan. 1955, p. 19-42.

Includes graphs. 15 ref.

6475* Measuring the Thermal Conductivity of Liquids. **Die Messung der Wärmeleitfähigkeit von Flüssigkeiten. II.** Cylinder, Sphere, and Heating-Wire Processes. **Zylinder-, Kugel- und Hitzdrahtverfahren.** (German.) L. Riedel. *Archiv für technisches Messen*, 1955, no. 228, Jan., p. 15-18.

Measuring devices and factors to be considered. Diagrams. 23 ref.

6476* Ionic and Covalent Contributions to the Hydrogen Bond. I-II. (English.) C. A. Coulson and U. Danielsson. *Arkiv för Fysik*, v. 8, no. 3, 1954, p. 239-255.

Theoretical approach to the validity of the O-H. . .O system and to determine whether any significant degree of covalent binding exists in that region. Graphs, table, diagrams. 33 ref.

6477* Contributions to the Colloid-Chemical Analysis of Bituminous Coal Tar. **Beitrag zur kolloidchemischen Analyse**

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6481* Mechanism of Thermal Decomposition of Sodium Iodide Under the Action of Sodium Metaphosphate. **Sur le mécanisme de la décomposition thermique de l'iodure de sodium sous l'action du métaphosphate de sodium.** (French.) Remziye Salih Hisar. *Bulletin de la société chimique de France,* 1955, no. 2, Feb., p. 229-231.

Includes table, graphs. 2 ref.

6482 Symposium on Physical Adsorption of Gases by Solids. *Canadian Journal of Chemistry,* v. 33, Feb. 1955, p. 165-351.

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6483 The Photolysis of Acetone in the Presence of Hydrogen Bromide. M. J. Ridge and E. W. R. Steacie. *Canadian Journal of Chemistry,* v. 33, Feb. 1955, p. 383-390.

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Effect of precipitation pH on later dispersion. Graph. 17 ref.

6485 Absorption Spectra of Metals in Solution. H. Blades and J. W. Hodgins. *Canadian Journal of Chemistry,* v. 33, Feb. 1955, p. 411-425.

Studies on NH_3, CH_3NH_2, and $C_2H_5NH_2$ solutions of Li, Na, K, and Ca. Tables, graph, diagram, ultra-violet spectra. 9 ref.

6486 Generalized Activity Coefficients of Hydrocarbon Mixture Components. Wayne C. Edmister and Charles L. Ruby. *Chemical Engineering Progress,* v. 51, Feb. 1955, p. 95F-101F.

Correlation reduces data to six charts. Tables, graphs. 42 ref.

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The amount of SO_2 absorbed by individual drops of water and of several hydrocarbons was measured continuously during their formation at the tip of a capillary tube. Diagrams, graphs, tables, photographs. 10 ref.

6488 The Use of a Sedimentation Cell in the Sampling of Aerosols. J. F. Richardson and E. R. Wooding. *Chemical Engineering Science,* v. 4, Feb. 1955, p. 26-28.

The limited range of conditions under which a reliable sample is obtained are discussed, and recommendations are made for the design of the cell. Diagram, graph. 6 ref.

6489 The Production of Active Solids by Thermal Decomposition. V. The Sintering of Active Magnesium Oxide. VI. The Calcination of Magnesium Hydroxide. S. J. Gregg and R. K. Packer, and K. H. Wheatley. *Chemical Society, Journal,* 1955, Jan., p. 46-55.

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Studies from 90 to 270 K. 16 ref.

6492 Reactions Between Hydrogen Peroxide and Halide Ions. M. C. R. Symons. *Chemical Society, Journal,* 1955, Jan., p. 273-276.

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6493* Diphenylene-Phenyl-Iodide. **Über Diphenylen-phenyljod.** (German.) Karl Clauss. *Chemische Berichte,* v. 88, no. 2, 1955, p. 268-270.

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Formation and properties of elements 93 to 100. Tables. (To be continued.)

6495* Separation of Rare Earths in the Inhomogeneous Magnetic Field. **Trennung der seltenen Erden im inhomogenen Magnetfeld.** (German.) I. Noddack and E. Wicht. *Chemische Technik,* v. 7, no. 1, Jan. 1955, p. 3-5.

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6504* Kinetics of Ionization of Molecular Hydrogen on a Platinum Electrode and the Role of Anions. **Kinetika ionizatsii molekuliarnogo vodoroda na platinovom elektrode i rol' anionov.** (Russian.) A. N. Frumkin and E. A. Aikazian. *Doklady Akademii Nauk SSSR*, v. 100, no. 2, Jan. 11, 1955, p. 315-318.
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Includes diagrams, tables, graphs. 25 ref.

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Includes diagram, graphs, tables. 25 ref.

6539* Catalytic Activity of Adsorption Platinum Catalysts During the Disintegration of Hydrogen Peroxide. **Kataliticheskaia aktivnost' adsorbtsionnykh platinovykh katalizatorov pri razlozhenii perekisi vodoroda.** (Russian.) A. A. Lopatkin, V. I. Shekhobalova, and V. P. Lebedev. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2222-2231.

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6541* Interaction of Molten Nitrates and Nitrites of Metals of the First and Second Groups of D. I. Mendeleev's Periodic System. **O vzaimodeistvii nitratov i nitritov metallov pervoi i vtoroi grupp periodicheskoi sistemy D. I. Mendeleeva v rasplavakh. XIII.** Electric Conductivity of the Binary Systems of $CsNO_3$-$Cd(NO_3)_2$, $TlNO_3$-$Cd(NO_3)_2$, and KNO_3-$RbNO_3$. **Elektroprovodnost' dvoinykh sistem nitrat tseziia-nitrat kadmiia nitrat talliia-nitrat kadmiia i nitrate kaliia-nitrat rubidiia.** (Russian.) P. I. Protsenko and N. P. Popovskaia. *Zhurnal Obshchei Khimii*, v. 24, no. 12, Dec. 1954, p. 2119-2126.

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6543 Catalysis. Paul H. Emmett, editor. v. II. Fundamental Principles. Pt. II. 473 p. 1955. Reinhold Publishing Corp., New York. (QD501 Em64c)

Discussion of fundamental theory and classification of catalysts according to current ideas of solid state physics.

See also:

6224 (structures in $Ca(OH)_2$-H_2O system)
6234 (theory of evaporation rates)
6337 (migration of double bonds)
6342 (absorption spectra)
6348 (double bonds in unsaturated amines)
6354 (Na as a catalyst)
6393 (hydrogen-bond formation)
6418 (condensation of SCl_4 with cyclohexane)
6437 (catalytic isomerization)
6443 (physical properties of methylsiloxanes)
6630 (behavior of Ag, AgCl, Hg, and HgCl electrodes)
6631 (kinetics of electrode processes)
6742 (effect of diluents on burning velocities)
6821 (specific heat of NaCl)
7299 (crystallization of TiO_2)

COATINGS

6544* Corrosion Protection of Pure Al, Raffinal, and Reflektal. **Anwendung von Böhmitschichten für den Korrosionsschutz von Reinaluminium, Raffinal und Reflektal.** (German.) D. Altenpohl. *Aluminium*, v. 31, no. 2, Feb. 1955, p. 62-69.

Chemical resistance of various oxide films; method of producing Böhmite films. Tables, graphs. 21 ref.

6545 Apparatus for Automatically Recording Strains Between Enamel and Metal. Jesse D. Walton, Jr. *American Ceramic Society, Journal*, v. 38, Mar. 1955, p. 114-118.

Construction and operation of a mechanism for converting the movement of an enameled split ring into a suitable electrical signal to be automatically recorded. Photographs, diagram, graphs, table. 2 ref.

6546 The Use of Agricultural Products in Surface Coating. Wayne R. Fuller. *American Paint Journal*, v. 39, Feb. 14, 1955, p. 70 + 6 pages.

Uses of various vegetable and animal oils in paints and varnishes.

6547 Fundamentals of Paint, Varnish, and Lacquer Technology. Chap. XIV. Industrial and Special Maintenance Finishes—Air Dry. II. Elias Singer, *American Paint Journal*, v. 39, Feb. 14, 1955, p. 88 + 5 pages.

Includes tables. (To be continued.)

6548 A New Resinous Polyalcohol for the Coatings Industry. R. B. Drubel, A. L. Cipriano, and W. A. Henson. *American Paint Journal*, v. 39, Mar. 7, 1955, p. 84 + 9 pages.

Properties of Dow Resin 622 fatty acid esters. Graphs, diagrams, tables.

6549 Acrylic Monomers in Coating Vehicles. E. H. Riddle. *American Paint Journal*, v. 39, Mar. 21, 1955, p. 46, 48, 50, 52.

Application of acrylic and methacrylic esters is discussed.

6550 Fundamentals of Paint, Varnish, and Lacquer Technology. Chap. XIV. Industrial and Special Maintenance Finishes. Air Dry. III. Elias Singer. *American Paint Journal*, v. 39, Mar. 21, 1955, p. 100 + 9 pages.

Aluminum, silk screen, chemically resistant, and cloth paints described; formulations.

6551 Moisture Pick-Up of Roofing Paper. **Über die Feuchtigkeitsaufnahme der Dachpappe.** (German.) Anton W. Rick and B. Rick-Weismann. *Bitumen, Teere, Asphalte, Peche*, v. 6, no. 1, Jan. 1955, p. 26-28.

Research report on different types of roll roofing with bases of paper, jute, plastic, and other materials. Table. (To be continued.)

6552 Chemical Nickel Plating Comes to the Fore. *Chemical Engineering*, v. 62, Mar. 1955, p. 220, 222.

Excellent, even plates formed. Photograph, flowsheet.

6553* Roof-Painting Substances From Lignite-Tar Oils. **Dachanstrichmittel auf der Grundlage von Braunkohlenteerölen.** (German.) E. Gundermann. *Chemische Technik*, v. 7, no. 1, Jan. 1955, p. 20-26.

Evaluation of experimental data; addition effects; descaling and softening agents. Tables. 8 ref.

6554* New Studies of the Metallizing Processes. **Nuevos estudios sobre los procesos de metalizacion.** (Spanish.) A. Matting. *Ciencia y técnica de la Soldadura*, v. 4, no. 20, Sept.-Oct. 1954, 14 p.

Processes taking place at the tip of wire; formation and acceleration of particles in alloys; the metallized coating. Photographs, drawings, diagrams, graphs, micrographs. 7 ref.

6555 Metallizing for Corrosion Prevention. A. P. Shepard and R. J. McWaters. *Corrosion*, v. 11, Mar. 1955, p. 115-118; disc., p. 118.

Problems and techniques connected with the spraying of molten metal on Fe and steel.

6556 Deposition of Titanium Coatings From Pyrosols. A. W. Schlechten, M. E. Straumanis, and C. B. Gill. *Electrochemical Society, Journal*, v. 102, Feb. 1955, p. 81-85.

Protective Ti films can be deposited on Cu and Fe in molten salt baths. Mechanism of the Ti transfer. Graphs, micrographs. 8 ref.

6557 Use of Cast-Iron Ground-Coats. P. Rogers. *Foundry Trade Journal*, v. 98, Feb. 3, 1955, p. 121-123.

Features of various types of enamel bases.

6558 Metal Finishes—Paint Versus Porcelain. J. P. Gardner. *Industrial Finishing*, v. 31, Feb. 1955, p. 42 + 7 pages.

Recent inroads of organic coatings on the vitreous enamel market.

6559* The Use of Silicone Resins in Protective Coatings. T. W. Watson. *Institute of Metal Finishing, Bulletin*, v. 4, Winter 1954-1955, p. 299-306.

Properties, advantages, and disadvantages.

6560 Molybdenum Depostion on Titanium. Sam Tour, Andre Styka, and George Fischer. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 291-296.

Hard, adherent, and wear-resistant coatings are vapor deposited without changing micro-structure of the Ti. Diagram, tables, micrographs. 4 ref.

6561 New Solution Ceramic Coatings. Kenneth Rose. *Materials & Methods*, v. 41, Feb. 1955, p. 107-108.

Water solutions (not suspensions) of metallic salts are sprayed followed by warming sufficiently for drying. Coating resists heating and corrosion. Photographs.

6562* Patents on Chemical and Electrochemical Polishing and Brightening of Metal Surfaces Since 1940. **Patente über das chemische und elektrochemische Polieren und Glänzen von Metalloberflächen seit 1940.** (German.) Hermann Baur. *Metalloberfläche*, Ausgabe A, v. 9, no. 2, Feb. 1955, p. 22-28.

Patent numbers, dates, polishing solutions, additives, polishing temperatures, and currents for polishing ferrous and non-ferrous metals and alloys. Tables.

6563* Experimental Study and Control of Enamel-Metal Adherence. Application to Aeronautical Construction Steels and to Their Ceramic Protection. **Étude expérimentale et contrôle de l'adhérence émail-métal. Application aux aciers de construction aéronautique et à leur protection céramique.** (French.) S. J. Tonachella. *Métaux, Corrosion-Industries*, v. 29, no. 352, Dec. 1954, p. 483-509.

Results of adherence tests; influence of metal surface state; influence of different alloys; dilatometrics of metallic and ceramic materials; influence of additions; tests on refractory alloys. Tables, graphs. 39 ref.

6564 Tritium Determines Moisture Gradient in Attached Protective Coatings. G. D. Calkins, M. Pobereskin, V. E. Young, and L. J. Nowacki. *Nucleonics*, v. 13, Feb. 1955, p. 76-77.

Exposing varnished specimens to tritiated water vapor permits *in situ* evaluation. Graphs, table, diagram. 6 ref.

6565* Paint Thinners From Petroleum. I. George W. Waters. *Paint Industry Magazine*, v. 70, Jan. 1955, p. 12-14.

Requirements and composition. Table, diagram. (To be continued.)

6566 Isophthalic. *Paint, Oil & Chemical Review*, v. 118, Feb. 10, 1955, p. 10, 12, 14-17.

New alkyd resin intermediate give superior properties to paints. Graphs, tables, photographs.

6567* Decorative and Protective Coatings of "Hypalon". Malcolm A. Smook and Kenneth C. Smith. *Paint and Varnish Production*, v. 45, Feb. 1955, p. 25-29, 62.

A chlorosulfonated polyethylene elastomer which shows particular promise. Photographs.

6568* Drying Oil Technology. II. Refinery Operations. *Paint and Varnish Production*, v. 45, Feb. 1955, p. 30-33.

Steps in oil refining and treatment. Photographs, tables.

6569* Structure of Bodied Oils. Jean Petit. *Paint and Varnish Production*, v. 45, Feb. 1955, p. 37-38, 87.

The Diels-Alder reaction, secondary competing reactions, BF_3 treatment. Table. 6 ref.

6570* Silicones. **Über Silikone. XXIX.** The Use of Silicones as Lacquers and Paints. **Über die Anwendung von Silikonen als Lacke und Anstrichmittel.** (German.) Curt Gündel and Joh. Roch. *Plaste und Kautschuk*, v. 1, no. 12, Dec. 1954, p. 268-274.

High-temperature hardening and effect of dryers; application of silicon lacquers; properties and uses. Tables, diagram, photographs. 24 ref.

6571* The Use of Melamine Resins in Organic Protective Coatings. I. Greenfield. *Product Finishing*, v. 7, Sept. 1954, p. 61-68.

Melamine properties; production methods; formulation; advantages; application methods; uses. Photographs, structural formulas.

6572* Paint Film Defects and Their Remedies. VI. Silking, Flotation. H. J. Testro. *Product Finishing*, v. 7, Sept. 1954, p. 76-78, 122.

Discusses silking problems and flotation difficulties and possible remedies for each.

6573* Chemical Nickel Coating. **Khimicheskoe nikelirovanie.** (Russian.) S. M. Panchenko and M. A. Krokhina. *Vestnik Mashinostroeniia*, v. 34, no. 12, Dec. 1954, p. 68-70.

Theoretical basis of the method; practical applications; optimum conditions; comparison with electrolytic deposition process. Graphs, tables. 3 ref.

6574 Hot Dip Galvanizing Is a Science. I. Wallace G. Imhoff. *Wire and Wire Products*, v. 30, Feb. 1955, p. 167-170, 233-235.

Scientific principles of producing high quality coatings at lowest cost. Photograph, tables, graph.

6575* The Growth of Thin Films. **Zum Wachstum dünner Schichten.** (German.) G. Cario and J. H. Kallweit. *Zeitschrift für Physik*, v. 140, no. 1, 1955, p. 47-56.

Factors which influence the properties of vapor-deposited films. Micrographs, diagram, graphs. 11 ref.

See also:

6282 (determination of styrene)
6426 (properties of perlauric acid)
6470 (polymerization of drying oils)
6585 (coatings for corrosion control)
6601 (coatings for steel tanks)
6820 (measurement of gloss)
6864 (high vacuum in industry)

CORROSION

6576 Effect of Electric Field on Oxidation of Copper. (English.) H. H. Uhlig and A. E. Brenner. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 108-109.

Within experimental error no effects of field strengths up to 15,500 v. was observed. Graph, table. 3 ref.

6577* Corrosion Studies. **Korrosionsstudium. I.** Polarographic Observation of Metal Corrosion. **Ein Beitrag zur polarographischen Verfolgung der Metallkorrosion.** (German.) I. Sekerka and J. Vorlíček. *Collection of Czechoslovak Chemical Communications*, v. 19, no. 6, Dec. 1954, p. 1335-1338.

Data do not agree with Van Eq. Rysselberghe's observations. Graphs, oscillograms. 5 ref.

6578* Mechanism of Anodic Attack of Cu. **Mécanisme de l'attaque anodique du cuivre.** (French.) René Audubert. *Comptes rendus*, v. 239, no. 25, Dec. 20, 1954, p. 1792-1795.

Kinetic theory of overvoltage makes it possible to explain the mechanism of anodic dissolution of Cu in an acid medium. Graphs. 2 ref.

6579 Minimizing Stress Corrosion Cracking of Cylinder Valves. Mortimer Schussler. *Corrosion*, v. 11, Mar. 1955, p. 105-108.

Corrosion tests on forged Al bronze valve bonnets. Design considerations. Remedial measures. Micrographs, photographs, diagrams, tables.

6580 Corrosion Evaluation of Ship Bulkhead and Hull Plating by Audigage Thickness Measurements. Dwight J. Evans. *Corrosion*, v. 11, Mar. 1955, p. 109-113; disc., p. 113-114.

Audigage equipment and operating procedures. Photograph, diagram, tables.

6581 Corrosion of Aircraft Structural Materials by Agricultural Chemicals. II. Effect of Insecticides, Herbicides, Fungicides and Fertilizers. Charles F. Schreiber. *Corrosion*, v. 11, Mar. 1955, p. 119-130.

Corrosive and surface destruction effects of generally used agricultural chemicals on structural materials and finishes used in agricultural aircraft and dispersing equipment. Tables.

6582 Solution of Cathodic Protection Interference Problems. Francis W. Ringer. *Corrosion*, v. 11, Mar. 1955, p. 131-138.

Corrosion

Determining the extent of possible interference of underground protection devices on neighboring structures which are not primarily considered as being a part of the cathodic protection system. Table. 3 ref.

6583 Cathodic Protection Applied to a Large-Diameter Oil Pipe Line System. Dean O. Griffith. *Corrosion*, v. 11, Mar. 1955, p. 139-142.

Equipment and operation techniques. Photographs, diagrams.

6584 Proposed Standardized Laboratory Procedure for Screening Corrosion Inhibitors for Use in Oil and Gas Wells. *Corrosion*, v. 11, Mar. 1955, p. 143-146.

A static oil and water immersion test using the wt. loss of a steel coupon when under the influence of an inhibited system compared to its wt. loss under an unhibited system. Table, diagram.

6585* Principles of Corrosion. IV. Prevention of Corrosion. W. H. J. Vernon. *Corrosion Prevention and Control*, v. 2, Feb. 1955, p. 21-29.

Resistance improved by purifying and alloying. Coatings of reaction product, organics, inorganics, and metals for control. Table, graphs, diagram. 10 ref.

6586* Carbon and Graphite as Resistant Materials. II. M. Buis. *Corrosion Prevention and Control*, v. 2, Feb. 1955, p. 37-40, 58.

Fabrication and use in plant construction. Table, graph, photograph. (To be continued.)

6587 Corrosion of Ships. A. Pickworth. *Corrosion Technology*, v. 2, Feb. 1955, p. 32-36.

Causes; protective measures; design features. Photographs.

6588 Localised Corrosion in Steam Boilers. I. R. N. Parkins. *Corrosion Technology*, v. 2, Feb. 1955, p. 43-46.

Types of pitting corrosion. Graphs, photographs. 10 ref.

6589 Cathodic Protection of Underground Structures. I. W. Godfrey Waite. *Corrosion Technology*, v. 2, Feb. 1955, p. 47-49.

Theory; methods. Diagrams.

6590 Corrosion of Tinplate by Foods Packed in Cans. II. Denis Dickinson. *Corrosion Technology*, v. 2, Feb. 1955, p. 49-51.

Corrosive effects of different fruits and vegetables. Effects of trace elements in the form of spray residues. Importance of lacquers. Table, photograph. 10 ref.

6591 Polarization Studies of Copper, Nickel, Titanium, and Some Copper and Nickel Alloys in Three Per Cent Sodium Chloride. H. B. Bomberger, F. H. Beck, and M. G. Fontana. *Electrochemical Society, Journal*, v. 102, Feb. 1955, p. 53-58.

Relationships between potential, time, current, corrosion rate, and solution velocity. Diagram, tables, graphs. 11 ref.

6592 Effect of Oxygen, Chlorides, and Calcium Ion on Corrosion Inhibition of Iron by Polyphosphates. H. H. Uhlig, D. N. Triadis, and M. Stern. *Electrochemical Society, Journal*, v. 102, Feb. 1955, p. 59-66.

Corrosion data indicate that sodium polyphosphates inhibit by favoring passivation by absorbed O. A critical supply of O is required. Diagram, graphs, table. 24 ref.

6593 The Crystallographic Dependence of the Oxidation Potential of Solid Copper. W. E. Tragert and W. D. Robertson. *Electrochemical Society, Journal*, v. 102, Feb. 1955, p. 86-94.

Dependence of oxidation potentials on the various crystallographic planes exposed to the active medium. Tables, graphs. 26 ref.

6594 The Corrosion of Tin by Aqueous Solutions of Ammonia. S. C. Britton and D. G. Michael. *Journal of Applied Chemistry*, v. 5, Jan. 1955, p. 1-9.

Conditions for prevention of attack; inhibitor additions. Tables, graph. 5 ref.

6595 The Corrosion of Tin in Solutions of Sodium Alkyl Sulphates. T. K. Ross. *Journal of Applied Chemistry*, v. 5, Jan. 1955, p. 10-18.

Mechanism of pitting corrosion in solutions containing surface active agents. Graphs, micrographs. 22 ref.

6596 Oxidation of Cobalt Metal. R. E. Carter, F. D. Richardson, and C. Wagner. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 336-343.

Oxidation occurs by outward diffusion of Co through the oxide. Calculated and measured oxidation rates are in agreement. Tables, photograph, graphs, micrograph. 17 ref.

6597 Controlling Corrosion in Aluminum Fabrication. II. M. J. Pryor. *Light Metal Age*, v. 12, Feb. 1955, p. 13-16, 33.

Design considerations for avoiding conditions leading to corrosion damage. Diagrams.

6598* Inter- and Transcrystalline Corrosion and Its Testing. **Die inter- und transkristalline Korrosion und ihre Prüfung.** (German.) Friedrich-Carl Althof. *Metall*, v. 9, nos. 3-4, Feb. 1955, p. 110-120.

Principles of testing; description and evaluation of different types of test; resistance of different ferrous and non-ferrous metals and alloys to inter- and transcrystalline corrosion. Diagrams, graphs, photograph, tables. 36 ref.

6599* Sea Water Corrosion of Steel Pieces. **Corrosion marine des ouvrages en acier.** (French.) G. Dechaux and E. Segol. *Métaux, Corrosion-Industries*, v. 29, no. 352, Dec. 1954, p. 469-482.

Experimental data on the functioning of corrosion cells in an alkaline and aerated medium. Photographs, micrographs, graphs.

6600* Oil Refineries and Corrosion by Water. Methods of Prevention. P. W. Sherwood. *Petroleum*, v. 18, Feb. 1955, p. 50-53.

Three principal variables determine the degree of corrosiveness where attack by water is involved and six major methods are recognized for its control.

6601 Protect Steel Tanks From Corrosion. Harry J. Keeling. *Petroleum Refiner*, v. 34, Feb. 1955, p. 140-142.

Corrosion can virtually be eliminated by insulating metal with protective coating or applying cathodic protection current to submerged metal. Photographs, diagram.

6602* Here Is Why Pipe Lines Corrode. Maurice A. Riordan. *Pipe Line Industry*, v. 2, Mar. 1955, p. 36-39.

Corrosion mechanisms; evaluation of corrosion circuits. Diagrams.

6603* How to Combat Internal Corrosion. Russell A. Brannon. *Pipe Line Industry*, v. 2, Mar. 1955, p. 44-49.

Corrosion protection by means of coatings and inhibitors. Photographs, diagrams, table.

6604* How to Design Cathodic Protection Systems. Wayne A. Johnson. *Pipe Line Industry*, v. 2, Mar. 1955, p. 58-60, 64.

Soil and current requirements; equipment tests and selection. Photographs, diagrams, graph.

6605* Corrosion of Metals by Acid River Water. I. Theoretical Consideration of Corrosion of Iron and Steel. (English.) Saburo Shimodaira. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 6, no. 5, Oct. 1954, p. 431-445.

Determination of rate and type of corrosion by stagnant and flowing water. Tables, graphs. 21 ref.

6606* Fretting Corrosion as a Cause of Fracture of Shrunk-On Crank Shafts of Large Piston Engines. **Reibkorrosion als Bruchursache bei aufgeschrumpften Kurbelwellen von Grosskolbenmaschinen.** (German.) Franz Jaklitsch. *Stahl und Eisen*, v. 75, no. 2, Jan. 27, 1955, p. 97-98.

Reduction of fatigue strength by combined abrasion and corrosion. Table, photographs. 3 ref.

6607* Field Investigation of Corrosion in Alkaline Pulping Equipment. C. B. Christiansen and J. B. Lathrop. *Tappi*, v. 38, Feb. 1955, p. 122-128.

Forces which cause corrosion in digesters. Recommendations for extending the service life of alkaline pulping equipment. Diagrams, graphs, table.

6608* Solid Products of Corrosion as Corrosion-Governing Elements. **Die festen Korrosionsprodukte als korrosionslenkende Faktoren.** (German.) W. Feitknecht. *Werkstoffe und Korrosion*, v. 6, no. 1, Jan. 1955, p. 15-26.

Detailed results show manner in which the solid products govern the whole corrosion process according to their constitution, formation, and dispersal. Micrographs, tables, graphs, diagrams, X-ray diagram. 26 ref.

6609* Inhibition and Inhibitors. **Inhibition und Inhibitoren.** (German.) Hellmuth Fischer. *Werkstoffe und Korrosion*, v. 6, no. 1, Jan. 1955, p. 26-31; disc., p. 31-32.

Discusses the mechanism of physical and chemical inhibition, its existence and use. Tables, diagrams. 10 ref.

6610* Kinetics of Intercrystalline Corrosion of Chromium-Nickel Stainless Steels. **Kinetika mezhkristallitnoi korrozii khromonikelevykh nerzhaveiushchikh stalei.** (Russian.) V. Sh. Shekhtman, M. A. Vedeneeva, and N. P. Zhuk. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2199-2210 + 1 plate.

Effects of heat treatment, composition and concentration of corrosion medium, cold working, and trace-element content of steel. Special electrical method of investigation. Graphs, micrographs, diagrams, tables. 18 ref.

6611* Use of Fe^{59} for Investigating the Mechanism of Iron Oxidation. **Primenenie Fe^{59} dlia issledovaniia mekhanizma okisleniia zheleza.** (Russian.) B. V. Linchevskii and N. P. Zhuk. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2265-2267.

Experimental data on the distribution of activity in iron scale. Graphs, table. 5 ref.

Books and Miscellaneous Publications

6612* **Corrosion Data Survey.** G. A. Nelson, compiler. Sections individually paged. 1954. Shell Development Co., Emeryville, Calif. (TA462 Sh43c)

Factors used in evaluating corrosion resistance of constructional materials for chemical plant service.

See also:

6530 (passivation of Ti, Zr, Hf, and Th)
5644 (corrosion protection of pure Al)
7006 (internal oxidation of Cu)
7062 (corrosion of valve springs)
7065 (corrosion fatigue of steel)
7414 (properties of brazing alloys for heat resistant metals)

ELECTRICAL ENGINEERING

6613 Mercury Lamps—Light Made to Order. L. J. Buttolph. *General Electric Review*, v. 58, Mar. 1955, p. 27-31.

Design, operation, characteristics, and applications. Photograph, table, diagrams.

6614 Testing Multiple Circuits by Card-Programmed Machine. J. A. Potter. *Electrical Manufacturing*, v. 55, Mar. 1955, p. 140-145.

Design details and application procedures for machine with 900 test leads. Photographs, tables, diagrams.

6615* Magnetic Current Distributors. **Über magnetische Stromteiler.** (German.) H. Rösch. *Elektrotechnik und Maschinenbau*, v. 72, no. 1, Jan. 1, 1955, p. 1-6.

Method of assuring definite current distribution in an arbitrary no. of parallel circuits with one current distributor. Diagrams, graph.

6616* Determination of the Temperatures in the Stator of a Turbogenerator. **Beitrag zur Ermittlung der Temperaturen im Stator eines Turbogenerators.** (German.) L. v. Szalay. *Elektrotechnik und Maschinenbau*, v. 72, no. 2, Jan. 15, 1955, p. 25-28.

Mathematical computations. Diagrams, graphs, table. 5 ref.

6617* Recent Developments in the Design of Electrical Machines. **Neuere Entwicklungen im Bau elektrischer Maschinen.** (German.) Walter Putz. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 1, Jan. 1955, p. 48-53.

Review of literature on modern materials and designs of generators and motors. Diagrams, photographs. 56 ref.

6618* Problems of Magnetic Preamplifiers. **Probleme magnetischer Vorverstärker.** (German.) Fritz Kümmel. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 3, Feb. 1955, p. 113-120.

Comparison of stationary characteristics of Se and Ge rectifiers, and high-vacuum tubes with inductance coils. Circuit diagrams, graphs. 3 ref.

6619* A.C. Asynchronous Motors With Asymmetrical Stator Winding Circuit. **Über Drehstrom-Asynchronmotoren mit unsymmetrischer Schaltung der Ständerwicklung.** (German.) Walter Schmitt and Heinz Jordan. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 3, Feb. 1955, p. 124-131.

Basic formulas for computing behavior of current and torque; energy loss due to heat effect; effects and limitations of asymmetrical circuits. Diagrams, graphs. 12 ref.

6620* Control of Interruption Disturbances Through Compressed-Air Switches. **Beherrschung von Umschlagstörungen durch Druckluftschalter.** (German.) Paul Baltensperger and Erich Ruoss. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 3, Feb. 1955, p. 132-134.

Investigation with different types of switch and methods of extinction; results of cut-off experiments with compressed-air switches. Diagrams, photograph, table, oscillograms. 7 ref.

6621* Measuring the Time and Speed of Off and On Switching for High-Tension Switches. **Izmerenie vremeni i skorosti vkliucheniia i otkliucheniia vysokovol'tnykh vykliuchatelei.** (Russian.) P. V. Kuznetsov. *Energetik*, v. 3, no. 1, Jan. 1955, p. 28-31.

Data on several types of breaker switches. Measuring equipment. Table, graphs, diagrams.

6622* Contributions to the Struggle Against Irreversibilities. **Beiträge zum Kampf gegen die Nichtumkehrbarkeiten.** (German.) L. Heller. *Energietechnik*, v. 4, no. 11, Nov. 1954, p. 490-494.

Theoretical methods of increasing the efficiency of energy-consuming mechanisms. Diagrams, graphs, table. 9 ref.

6623* **Constant-Frequency A.C. System for Aircraft.** *Engineer*, v. 199, Feb. 4, 1955, p. 156-159.

System driven by aircraft propulsion engines at variable speeds delivers constant frequencies within ± 1%. Diagrams, circuit diagrams, photographs, tables.

6624* **Turbine Generators—Present and Future.** Edwin H. Krieg. *Power Apparatus and Systems*, 1955, no. 16, Feb., p. 1735-1745; disc., p. 1745-1746.

Review of steam turbine generators. Diagrams, tables, photographs, graph.

6625 A-C Voltage Regulators. William P. Carpenter. *Product Engineering*, v. 26, Feb. 1955, p. 135-139.

Four systems which provide this necessary control. Table, circuit diagrams, photographs. (To be continued.)

6626 Symposium on Temperature Stability of Electrical Insulating Materials, (Annual Volume), v. 57, 1954. 136 p. American Society for Testing Materials, Philadelphia. (TK3431 Am35s)

Eleven papers on insulating technology and the development of test methods for heat stability determination of the newer materials.

6627* Generation of Undamped Electrical Oscillations in Series and Parallel Oscillating Circuits. **Die Erzeugung ungedämpfter elektrischer Schwingungen in Serien- und Parallelschwingkreisen.** (German.) Harry Pfeifer. *Zeitschrift für angewandte Physik*, v. 6, no. 11, Nov. 1954, p. 508-510.

Use of negative resistors with only electric-arc or dynatron characteristics, depending on source of sinusoidal oscillations. Circuit diagrams. 8 ref.

Electrical Engineering

6628* Highly Constant Sources of Direct or Alternating Currents of Average Voltages for Testing Purposes. **Hochkonstante Gleich- und Wechselspannungsquellen mittlerer Spannungen für Prüfzwecke.** (German.) Harald Helke and Rudolf Stenzel. *Zeitschrift für angewandte Physik*, v. 6, no. 11, Nov. 1954, p. 521-528.

Processes and equipment for stabilizing voltages; circuits of pure stabilization with glow-gap dividers and methods based on electronic tubes and photoelectricity; determination of constancy of voltages with bridge circuits of linear and non-linear resistors. Diagrams, graph, photograph. 22 ref.

Books and Miscellaneous Publications

6629 Raw Materials for Electric Cables. A. King and V. H. Wentworth. 362 p. 1954. Ernest Benn, London. (TK3301 K58r) Comprehensive survey of materials for conductors, insulators, and protective coatings for ordinary and special purpose cables.

See also:
6881 (induction heating equipment)
7099 (rolling mill drives)
7372 (electrical properties of high polymers)

ELECTROCHEMISTRY AND ELECTROPROCESSES

6630 The Behavior of the Silver, Silver Chloride and the Mercury, Mercurous Chloride Electrodes at High Temperatures. M. H. Lietzke and J. V. Vaughen. *American Chemical Society, Journal*, v. 77, Feb. 20, 1955, p. 876-878.

System studied in 0.01 to 1.0 *M* HCl from 25 to 263 C. Table, graph, diagram. 6 ref.

6631* Kinetics of Electrode Processes. XII. Currents Due to Electrode Reactions at the Dropping Mercury Electrode Preceded by Consecutive Reactions in Solution. (English.) J. Koutecký. *Collection of Czechoslovak Chemical Communications*, v. 19, no. 6, Dec. 1954, p. 1093-1098.

Includes table. 5 ref.

6632* Investigation of the Electropolishing Process for Metals. **Issledovanie protsessa elektropolirovki metallov.** (Russian.) P. V. Shchigolev and N. D. Tomashov. *Doklady Akademii Nauk SSSR*, v. 100, no. 2, Jan. 11, 1955, p. 327-330.

Current density, polarization curves; anodic passivity phenomenon. Graphs, diagrams. 14 ref.

6633 Productivity and Cost Control in Metal Finishing. I. Influence of Product Design for Electroplating. F. C. Ashford. *Electroplating and Metal Finishing*, v. 8, Feb. 1955, p. 50-53.

Design considerations for economical plating and polishing operations. Diagrams, photographs.

6634 Throwing Power of Complex Copper Electrolytes. I. Solutions Containing Ethanolamines. A. V. Izmaylov and S. V. Gorbachev. *Electroplating and Metal Finishing*, v. 8, Feb. 1955, p. 54-57. (Translated from *Zhurnal Fizicheskoi Khimii*, v. 28, no. 2, Feb. 1954, p. 229-239.)

Previously abstracted from original. See item 11106, v. 3, Aug. 1954.

6635* Advances in Stannate Tin Plating—The Potassium Stannate Bath. J. W. Cuthbertson. *Industrial Finishing (London)*, v. 8, Jan. 1955, p. 21-24, 26-27.

Compares Na with K Sn plating; applications. Photographs, diagrams, graph, table. 11 ref.

6636 High-Production Line Deposits Quality Chrome Plate on Bumpers. Herb Chase. *Iron Age*, v. 175, Mar. 3, 1955, p. 115-118.

Equipment and operation of highly mechanized installation. Photographs.

6637 Automatic Control Permits Plating Cell Selection. T. J. Doyle. *Machinery*, v. 61, Mar. 1955, p. 180-187.

Operation of plating machine. Automobile bumpers are automatically shifted between adjacent plating cells and tanks. Table, diagrams, photographs.

6638* Conditions of Deposition and Structure of Compact Electrolytic Metal Deposits. **Abscheidungsbedingungen und Gefüge kompakter elektrolytischer Metallniederschläge. II.** Electrolytic Nickel Deposits in the Range of the FT and UD Type. **Elektrolytische Nickelniederschläge im Bereich des FT- und UD-Type.** (German.) J. Elze. *Metall*, v. 9, nos. 3-4, Feb. 1955, p. 104-109.

X-ray and metallographic studies of the effect of electroplating conditions on the structures of Ni deposits. Tables, micrographs, graphs. 14 ref.

6639 The Plating of Powder-Metallurgy Bronze Parts. E. V. Raymond, R. T. Foley, and W. L. Chu. *Plating*, v. 42, Feb. 1955, p. 150-151.

Oil impregnation before plating found beneficial in producing a good tin plate on sintered bronze. Micrographs. 6 ref.

6640 The Influence of the Physical Metallurgy and Mechanical Processing of the Basic Metal on Electroplating. I. Critical Review of the Literature. A. E. R. Westman and F. A. Mohrnheim. *Plating*, v. 42, Feb. 1955, p. 154-158, 195.

Influence of steel properties on characteristics of electrodeposited Ni-Cr coatings. Diagrams. 75 ref.

6641* Cures for Faults in Electroplating. Zinc Plating Troubles. J. H. Collins. *Product Finishing*, v. 7, Sept. 1954, p. 50-54.

Problems and their recommended cures in acid zinc and cyanide zinc plating. Tables.

6642 Electrodeposition of Titanium and Zirconium. Robert M. Creamer, David H. Chambers, and Charles E. White. *U. S. Department of Commerce, Office of Technical Services*, PB 111525, Dec. 1953, 27 p. (T21 Un3r)

Of aqueous, non-aqueous, and fused electrolytes tried, only a fused system of KCl-LiCl-$TiCl_3$ gave weighable plates on Fe, Ni, and Cu. Tables. 18 ref.

6643* Electrolysis at Constant Electrode Potential. **Zur Elektrolyse bei konstantem Elektrodenpotential. I.** Current-Time Curve at Retarded Discharge With Replenishment by Diffusion and Conclusions on the Kinetics. **Der Strom-Zeit-Verlauf bei gehemmter Entladung mit Nachlieferung durch Diffusion und Rückschlüsse auf die Kinetik.** (German.) H. Gerischer and W. Vielstich. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 3, nos. 1-2, Jan. 1955, p. 16-33.

Investigation of adjusting process on an electrode; determination of initial current strength by extrapolation to the switch-on moment; kinetics of discharge reaction; simple method for analyzing reaction mechanism. Graphs. 27 ref.

6644* Mechanism of the Influence of Alkaline Metal Ions on the Process of Electrodeposition of Copper. **Mekhanizm vliianiia ionov shchelochnykh metallov na protsess elektroosazhdeniia medi.** (Russian.) R. M. Vasenin and S. V. Gorbachev. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2156-2169.

Relation of cathode polarization and current density to coefficient of electron polarization of cations. Graphs, table. 22 ref.

Books and Miscellaneous Publications

6645 Storage Batteries. George Wood Vinal. 4th Ed. 446 p. 1955. John Wiley & Sons, New York. (QC605 V73s4)
Design and advances; physical and chemical properties of materials used; manufacturing processes; operating principles; industrial applications.

See also:
6504 (kinetics of ionization on electrodes)
6508 (electrochemical kinetics)
6562 (electrochemical polishing)
6902 (anode reactions)
6928 (electrolytic descaling of stainless steel)
6930 (interdependence of drawing, plating, and polishing operations)
6936 (grinding and polishing practices)
7179 (structures of electrolytic coatings)

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6646 Experimental Investigation of Noise Reduction in Traveling Wave Tubes. Amplification Measurements on a Velocity Step Tube. (English.) N. Bertil Agdur. *Acta Polytechnica (Electrical Engineering Series)*, v. 5, no. 9, 1954, 22 p. (T1 Ac81)

Studied as function of distance from anode to helix input. Phased entry of signal is described. Photograph, diagrams, graph. 12 ref.

6647 Theory of the Thermistor as an Electric Circuit Element. A Study of Thermistor Circuits. I. (English.) S. Ekelöf and G. Kihlberg. *Acta Polytechnica (Electrical Engineering Series)*, v. 5, no. 11, 1954, 36 p. (T1 Ac81)

Physics and mathematics of thermistors in circuits. Photograph, tables, graphs, diagrams. 7 ref.

6648 Method for Determining the Ratio of Planck's Constant to the Charge of the Electron Employing AC Amplification. G. F. Landegren. *American Journal of Physics*, v. 23, Feb. 1955, p. 87-88.

Includes circuit diagram, graphs. 2 ref.

6649 A Model Showing Current Conduction in an *n*-Type Semiconductor. Paul Rood. *American Journal of Physics*, v. 23, Feb. 1955, p. 106-108.

Explanation of transistor action. Photographs.

6650* Barrier-Layer Photoelectric Cells. **Sperrschicht-Photoelemente. II.** (German.) A. Kellermann. *Archiv für technisches Messen*, 1955, no. 229, Feb., p. 45-48.

Literature review of characteristics of photoelectric cells. Graphs. 55 ref.

6651 The Physical and Computing Significance of an Electrical Analogue of Creep and Recovery. A. J. Kennedy. *British Journal of Applied Physics*, v. 6, Feb. 1955, p. 49-58.

A voltage program to simulate the stressing, and the charge taken by the network is integrated and recorded as the creep strain analog. Graphs, table, circuit diagram. 24 ref.

6652* Properties and Applications of Thermistors. **Propriétés et applications des thermistances.** (French.) Guy Perronne. *Chaleur & Industrie*, v. 36, no. 354, Jan. 1955, p. 3-13.

Production, characteristics, and use in thermometry, heat control, voltage regulation, static relays, etc. Photographs, graphs, diagrams. 20 ref.

6653* Influence of the Effects of the Space Charge on the Oscillating Current of a Magnetron-Type "Carcinotron" Oscillator. **Influence des effets de la charge d'espace sur le courant d'accrochage d'un oscillateur "carcinotron" type magnétron.** (French.) Bernard Epsztein. *Comptes rendus*, v. 240, no. 4, Jan. 24, 1955, p. 408-410.

Includes diagram, graph. 6 ref.

6654* Measuring Time Constants on the Cathode Oscillograph. **Sur la mesure des constantes de temps à l'oscillographe cathodique.** (French.) Robert Guillien and Hermann Mayer. *Comptes rendus*, v. 240, no. 7, Feb. 14, 1955, p. 739-741.

Study of Tolstoï and Feofilov's method of measuring a time constant τ for a voltage $V=V_o e^{-t/tau}$. Graphs, circuit diagrams. 1 ref.

6655 Magnetic-Amplifier Design—A Practical Approach. Manfred Lilienstein. *Electrical Manufacturing*, v. 55, Mar. 1955, p. 90-98.

A simple procedure based on empirical constants and cut-and-try operations. Graphs, circuit diagrams, tables.

6656 A Sensitive Continuously-Evacuated Cathode-Ray Oscillograph. L. J. Griffiths, R. M. Davies, and D. A. Richards. *Electronic Engineering*, v. 27, Feb. 1955, p. 48-52.

Construction and operation of a tube and its associated electronic apparatus. Diagrams, circuit diagrams, oscillogram, photograph. 11 ref.

6657 Use of a Rubber Sheet Model for Investigation of Electron Trajectories. K. R. Allen and K. Phillips. *Electronic Engineering*, v. 27, Feb. 1955, p. 82-85.

Possibilities and accuracy of the sheet in plotting trajectories. A novel method of obtaining equipotentials. Diagrams, tables, photographs. 6 ref.

6658* The Universal Relay Calculating Machine (URRL) of the Institute of Low-Frequency Technology at the School of Technology in Vienna. **Die Universal-Relaisrechenmaschine (Urrl) des Instituts für Niederfrequenz-technik an der Technischen Hochschule Wien.** (German.) Heinz Zemanek. *Elektrotechnik und Maschinenbau*, v. 72, no. 1, Jan. 1, 1955, p. 6-12.

Circuits for basic calculation operations; discussion of the binary system. Circuit diagrams, tables, photograph. 4 ref.

6659* Introduction to the Theory of Rectifiers With Dielectric Resistance Load. **Einführung in die Theorie der Gleichrichter mit Ohmscher Widerstandsbelastung.** (German.) E. C. Metschl. *Elektrotechnik und Maschinenbau*, v. 72, no. 3, Feb. 1, 1955, p. 53-68.

Mathematical treatment of current and voltage patterns in the d.c. and a.c. rectifier circuits; conversion factors used in equipment design; computation of the ripple of the rectified voltage; uses of various circuits. Graphs, tables, diagrams. 4 ref.

6660* The State of Transistor Technology at the End of 1953. **Der Stand der Transistor-Technik Ende 1953.** (German.) J. Piesch. *Elektrotechnik und Maschinenbau*, v. 72, no. 4, Feb. 15, 1955, p. 83-89.

Curves for representing current characteristics; the transistor as an active quadrupole; self-excited and remote-control transistor oscillators. Graphs, circuit diagrams.

6661* History, Systematics, and Physics of Maximum-Frequency Electron Tubes. **Geschichte, Systematik und Physik der Höchstfrequenz-Elektronenröhren.** (German.) Werner Kleen. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 1, Jan. 1955, p. 53-64.

Development of electronic tubes; the system and mechanism of traveling-field tubes; the traveling-field magnetron; the carcinotron as a frequency generator; analogy between the expantion of free space-charge waves in electron flows and the expansion of electromagnetic waves in wave conductors. Diagrams, photographs, graphs, circuit diagrams. 52 ref.

6662* Directional Radio Transmission With Respect to the International Recommendations for Telecommunications Traffic. **Die Richtfunk-Übertragung im Hinblick auf die internationalen Empfehlungen für den Nachrichten-Weitverkehr.** (German.) *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 1, Jan. 1955, p. 64-72.

Introduction into the technique of multichannel connections; multichannel systems with focussing according to frequency; beam modulation in frequency and multiple-channel systems; survey of the organization of the International Telecommunications Union. Diagrams, photographs, graphs.

6663 Semiconductors and the Transistor. E. W. Herold. *Franklin Institute, Journal*, v. 259, Feb. 1955, p. 87-106.

Review of laboratory developments. Applications. Future prospects. Diagrams, photograph, graphs, table. 33 ref.

6664* The Transistor as an Amplifying Element for Hearing Aids. **Der Transistor als Verstärkerelement für Hörhilfen.** (German.) Clemens Starke. *Frequenz*, v. 9, no. 1, Jan. 1955, p. 1-15.

Computation of amplifying properties with the aid of quadripolar theory; noise and power output of transistor; design of three-stage transistor hearing aid. Diagrams, graphs, photographs. 6 ref.

6665* Investigations of Dielectric Wave-Guides in Rods and Pipes. **Untersuchungen an dielektrischen Wellenleitern in Stab- und Rohrform.** (German.) P. Mallach. *FTZ; Fernmeldetechnische Zeitschrift*, v. 8, no. 1, Jan. 1955, p. 8-13.

Calculates phase constant, the attenuation and the field dimensions; method for measuring characteristic parameters in one operation. Graphs, diagram. 14 ref.

6666* Direction-Finding Equipment for Pulse-Phase Modulation. **Richtfunkgerät für Pulsphasenmodulation.** (Ger-

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man.) O. Laaff and O. Bettinger. *FTZ; Fernmeldetechnische Zeitschrift*, v. 8, no. 1, Jan. 1955, p. 43-48.

Includes graphs, photographs, circuit diagrams.

6667 Electromagnetic Wave Propagation on Helical Structures (A Review and Survey of Recent Progress). Samuel Sensiper. *I.R.E., Proceedings*, v. 43, Feb. 1955, p. 149-161.

Analyzes electromagnetic properties; characteristics of the sheath helix model; filter and contrawound helixes. Graphs, diagrams. 58 ref.

6668 Progress in Electron Emission at High Fields. W. P. Dyke. *I.R.E., Proceedings*, v. 43, Feb. 1955, p. 162-167.

Properties of field and T-F emitters and progress toward stabilizing their electrical performance under useful conditions. Field emission patterns, micrograph, graph, diagrams, photograph. 16 ref.

6669 A New High Temperature Silicon Diode. C. G. Thornton and L. D. Hanley. *I.R.E., Proceedings*, v. 43, Feb. 1955, p. 186-188.

Preparation and properties of a new type of high back voltage point contact diode. Graphs, photographs, circuit diagram. 2 ref.

6670 IRE Standards on Radio Aids to Navigation: Definitions of Terms, 1954. *I.R.E., Proceedings*, v. 43, Feb. 1955, p. 189-209.

Conditions; operations; radio fixing aids; definitions of standard navigation nomenclature and terms; glossary of electronic navigational systems. Diagrams.

6671 Investigations of Noise in Audio Frequency Amplifiers Using Junction Transistors. P. M. Bargellini and M. B. Herscher. *I.R.E., Proceedings*, v. 43, Feb. 1955, p. 217-226.

An examination of different circuit configurations; effects of input termination and operating point on noise factor; identification of noise sources. Circuit diagrams, graphs, table. 16 ref.

6672 Source Noise and Its Effect Upon Electronic Systems. J. B. Wiesner. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Electron Devices*, v. ED-1, no. 4, Dec. 1954, p. 3-10. (TK1 In6.6ed)

Ways of detecting and analyzing noise in communication systems. Diagrams, graphs.

6673 Microwave Oscillator Requirements for CW Radar. W. W. McLeod, Jr. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Electron Devices*, v. ED-1, no. 4, Dec. 1954, p. 11-21. (TK1 In6.6ed)

Functions of tubes in various radar systems. Diagrams, graphs.

6674 Stabilization of Microwave Oscillators. Earl J. Shelton, Jr. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Electron Devices*, v. ED-1, no. 4, Dec. 1954, p. 30-40. (TK1 In6.6ed)

Includes diagrams, graphs. 3 ref.

6675 Theory of Phenomenological Models and Measurements of the Fluctuating Output of CW Magnetrons. David Middleton. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Electron Devices*, v. ED-1, no. 4, Dec. 1954, p. 56-90. (TK1 In6.6ed)

A macroscopic theory yielding the significant parameters. Diagrams, graphs, table. 17 ref.

6676 Frequency and Phase Stability Considerations. H. H. Grimm, B. R. Mayo, and J. K. Records. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Electron Devices*, v. ED-1, no. 4, Dec. 1954, p. 107-120. (TK1 In6.6ed)

Theoretical requirements and measurement methods. Diagrams.

6677 The General Sources of Noise in Vacuum Tubes. J. R. Pierce. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Electron Devices*, v. ED-1, no. 4, Dec. 1954, p. 135-167. (TK1 In6.6ed)

Includes diagrams, graphs. 39 ref.

6678 A Method of Forming a Broad-Band Microwave Frequency Spectrum. R. E. Wall, Jr. and A. E. Harrison. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Microwave Theory and Techniques*, v. MTT-3, no. 1, Jan. 1955, p. 4-10. (TK1 In6.6mt)

Analytical and experimental examination. Diagram, graphs, tables. 5 ref.

6679 Graphical Filter Analysis. Harvel N. Dawirs. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Microwave Theory and Techniques*, v. MTT-3, no. 1, Jan. 1955, p. 15-21. (TK1 In6.6mt)

Includes charts, graphs. 2 ref.

6680 A Waveguide Impedance Meter for the Automatic Display of Complex Reflection Coefficient. Henry L. Bachman. *Institute of Radio Engineers, Transactions of the I.R.E. Professional Group on Microwave Theory and Techniques*, v. MTT-3, no. 1, Jan. 1955, p. 22-30. (TK1 In6.6mt)

Includes photographs, diagrams, circuit diagrams. 3 ref.

6681 The Properties of Artificial Dielectrics at Centimetre Wavelengths. John Brown and Willis Jackson. *Institution of Electrical Engineers, Proceedings*, v. 102, pt. B, no. 1, Jan. 1955, p. 11-16.

Properties compared with those of a solid material and an examination is made of possible definitions of refractive index and wave impedance. Diagrams, graph. 13 ref.

6682 Some Experiments on Artificial Dielectrics at Centimetre Wavelengths. M. M. Z. El-Kharadly. *Institution of Electrical Engineers, Proceedings*, v. 102, pt. B, no. 1, Jan. 1955, p. 17-25.

A parallel-plate transmission line developed for wave lengths between 8 and 11 cm. and used for examining properties of artificial dielectrics under conditions which approximate those existing in free space. Diagrams, graphs. 15 ref.

6683 Advantage of Electronic Control. C. E. Mathewson. *Instruments and Automation*, v. 28, Feb. 1955, p. 258-265.

Frequency-response analysis of each element shows that elimination of transmission-line lag is beneficial. Diagrams, graphs. 6 ref.

6684 Measurement and Control by Electronic Weighing. Verne C. Kennedy. *Instruments and Automation*, v. 28, Feb. 1955, p. 272-276.

Basic elements and their applications. Diagrams, photographs.

6685* High Speed Computers. B. W. Thomas. *ISA Journal*, v. 2, Mar. 1955, p. 73-76.

Review. Photographs, table. 14 ref.

6686* Miniaturization of Transducers for Mobile Applications. Othmar W. Sailer. *ISA Journal*, v. 2, Mar. 1955, p. 81-85.

Includes photographs, graphs, diagram. 20 ref.

6687 Measurement of Carrier Lifetimes in Germanium and Silicon. Donald T. Stevenson and Robert J. Keyes. *Journal of Applied Physics*, v. 26, Feb. 1955, p. 190-195.

Decay of photoconductivity was used to measure the lifetime of excess carriers in rectangular samples. Diagrams, graphs, table. 6 ref.

6688 Anomalous Forward Switching Transient in *p-n* Junction Diodes. N. T. Jones, R. H. Kingston, and S. F. Neustadter. *Journal of Applied Physics*, v. 26, Feb. 1955, p. 210-213.

Delay in the flow of forward current when a grown-crystal *p-n* junction diode is switched from reverse to forward bias is explained on the basis of an extra *p-n* barrier in the grown-crystal bar. Diagrams, graphs. 4 ref.

6689 Photoelectric Raman Spectrometer. John U. White, Nelson L. Alpert, and Arthur G. DeBell. *Optical Society of America, Journal*, v. 45, Mar. 1955, p. 154-166.

Description and performance. Diagrams, photograph, graphs. 15 ref.

6690 Scattering of Electrons by Charged Dislocations in Semiconductors. W. T. Read, Jr. *Philosophical Magazine*, v. 46, 7th ser., no. 373, Feb. 1955, p. 111-131.

Deals with both drift and Hall mobility when the current flows normal to the dislocations and a magnetic field acts on the dislocations. Diagram, graphs. 6 ref.

6691* Amsterdam Conference: Semiconductors. (English.) *Physica*, v. 20, no. 11, Nov. 1954, p. 801-1140.

Consists of 64 papers on theory and properties. A few of the articles are in German or French.

6692* Recombination Processes in Insulators and Semiconductors. Albert Rose. *Physical Review*, v. 97, ser. 2, Jan. 15, 1955, p. 322-333.

Includes diagrams, graph. 17 ref.

6693* Gold as an Acceptor in Germanium. W. C. Dunlap, Jr. *Physical Review*, v. 97, ser. 2, Feb. 1, 1955, p. 614-629.

Effects of Au in Ge, measured by means of Hall effect, resistivity, photoconductivity, diffusion, heat treatment, and other techniques. Diagrams, graphs. 16 ref.

6694* Properties of Germanium Doped With Cobalt. W. W. Tyler, R. Newman, and H. H. Woodbury. *Physical Review*, v. 97, ser. 2, Feb. 1, 1955, p. 669-672.

Measurements of the temperature dependence of electrical resistivity in *n*- and *p*-type crystals indicate that Co introduces acceptor levels in Ge at 0.31±0.01 e.v. from the conduction band and 0.25±0.01 e.v. from the valence band. Graphs. 9 ref.

6695* Motion of Electrons and Holes in Perturbed Periodic Fields. J. M. Luttinger and W. Kohn. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 869-883.

New method of developing an "effective-mass" equation for electrons moving in a perturbed periodic structure. 16 ref.

6696* Hyperfine Splitting of Donor States in Silicon. W. Kohn and J. M. Luttinger. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 883-888.

Theoretical calculations. Tables. 14 ref.

6697 Modulation of the Surface Conductance of Germanium and Silicon by External Electric Fields. G. G. E. Low. *Physical Society, Proceedings*, v. 68, no. 421B, Jan. 1955, p. 10-16.

Includes diagram, graphs. 4 ref.

6698 Carrier Extraction in Germanium. J. B. Arthur, W. Bardsley, M. A. C. S. Brown, and A. F. Gibson. *Physical Society, Proceedings*, v. 68, no. 421B, Jan. 1955, p. 43-50.

Large changes in carrier concentration allow further study on drift mobility. Diagrams, graphs. 10 ref.

6699* Junction Transistor Test Set. Dwight V. Jones. *Radio-Electronic Engineering*, v. 24, Mar. 1955, p. 7-9, 33-34.

Equipment for analyzing basic characteristics of junction transistors. Photographs, circuit diagrams, graph. 2 ref.

6700* Components for Mechanized Production. B. L. Davis. *Radio-Electronic Engineering*, v. 24, Mar. 1955, p. 12-13.

Methods of producing and using adhesive tape capacitors, "chip" resistors, and the pyrolytic carbon resistor. Photographs. 5 ref.

6701* Universal Numerical Computers. **Les calculatrices numériques universelles.** (French.) M. F. H. Raymond. *Technique et science aéronautiques*, 1954, no. 6, p. 373-388.

General principles and structure, code and program, and acceleration methods.

6702* Electronic Computers and Their Use in the Aeronautical Industry. **Less machines mathématiques électroniques et leur utilisation dans l'industrie aéronautique.** (French.) G. R. Serane. *Technique et science aéronautiques*, 1954, no. 6, p. 389-413.

Includes photographs, diagrams, circuit diagrams.

6703* Introduction to Transistor Electronics. I. Physical Basis of Conduction in Semi-Conductors. II. Potential Gradients and Current Carriers in Junction and Point Transistors. H. K. Milward. *Wireless World*, v. 61, Feb. 1955, p. 60-65; Mar. 1955, p. 133-136.

Theory and operation of the *p-n-p* junction type. Diagrams, graphs. 4 ref.

6704* The Secondary Emission of Luminescent Screens in Cathode Ray Tubes. **Die Sekundäremission von Leuchtschirmen in Elektronenstrahlröhren.** (German.) K. H. Jürgen Rottgardt, Wolfgang Berthold, and Herrmann Dietrich. *Zeitschrift für angewandte Physik*, v. 6, no. 12, Dec. 1954, p. 560-563.

Reduction of sticking potential of luminescent screen is accompanied by reduction of operating-gas pressure resulting from electron irradiation; regeneration of sticking potential by hydrogen charge in special fusion-sealed test tubes. Tables, graphs. 11 ref.

6705* Laws on the Return Current in Mercury-Vapor Current Rectifiers. **Gesetzmässigkeiten für den Rückstrom in Quecksilberdampf-Stromrichtern.** (German.) Ernst H. Ludwig. *Zeitschrift für angewandte Physik*, v. 7, no. 1, Jan. 1955, p. 17-27.

Shows that the processes which occur in the grid-anode chamber can be determined mathematically; results agree with measurements. Diagrams, graphs, cathode-ray oscillogram. 7 ref.

6706* The Electron Avalanche and Its Development Into the Self-Substained Discharge. **Die Elektronenlawine und ihre Entwicklung in die selbständige Entladung.** (German.) Heinz Raether. *Zeitschrift für angewandte Physik*, v. 7, no. 1, Jan. 1955, p. 50-56.

Cloud-chamber, electrical, and optical methods of recording electron avalanches; investigation of secondary processes which lead to self-sustained discharges. Photographs, diagrams, graphs, oscillograms. 25 ref.

6707* Germanium Dioxide With Slight Water Content. **Über Germaniumdioxyd mit geringem Wassergehalt.** (German.) G. Brauer and H. Renner. *Zeitschrift für anorganische und allgemeine Chemie*, v. 278, nos. 1-2, Jan. 1955, p. 108-112.

Experiments and X-ray studies indicate that the residual water in moderately dried hydrated GeO_2 is left in the adsorbed state rather than in the form of $H_2\ Ge_8O_{11}$. Diagram, table, graph. 5 ref.

6708* Angle of Incidence of Light on the Photoelectric Effect of PbS Films. **Richtungsabhängiger Photoeffekt an PbS-Schichten.** (German.) G. Schwabe. *Zeitschrift für Naturforschung*, v. 10a, no. 1, Jan. 1955, p. 78.

Magnitude of electromotive force as a function of angle of incidence and its reversal at perpendicular incidence of light determined on polycrystalline PbS annealed in air at 500 to 620 C. Diagram, graph. 5 ref.

6709* Dielectric Properties of Transition Layer in Semiconductors. **O dielektricheskikh svoistvakh perekhodnykh sloev v poluprovodnikakh.** (Russian.) B. M. Vul. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 3-10.

Includes circuit diagram. 9 ref.

6710* Flat Germanium Photodiodes. **Ploskostnye germanievye fotodiody.** (Russian.) Zh. I. Alferov, B. M. Konovalenko, S. M. Ryvkin, V. M. Tuchkevich, and A. I. Uvarov. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 11-17.

Volt-ampere characteristics; illumination intensities; spectral distribution of sensitivity. Graphs, table, diagram. 3 ref.

Books and Miscellaneous Publications

6711 Transistors: Theory and Applications. Abraham Coblenz and Harry L. Owens. 313 p. 1955. McGraw-Hill, New York. (QC544.T3 C63t)

Operation, design, and characteristics of Ge and Si types.

6712 Control-System Dynamics. Walter R. Evans. McGraw-Hill Electrical and Electronic Engineering Series. 282 p. 1954. McGraw-Hill, New York. (TJ213 Ev16c)

Typical components; transient response; transfer functions; frequency-response and root-locus methods; multiple-loop systems; circuit analysis; determinants; graphical analysis of non-linear systems.

Electronics

6713* **Bibliography on Physical Electronics.** Wayne B. Nottingham. 428 p. 1954. Addison-Wesley Publishing Co., Cambridge, Mass. (ZQC701 N84b)

6714 **Active Networks.** Vincent C. Rideout. 485 p. 1954. Prentice-Hall, New York. (TK3226 R43a)

Fundamentals of all networks capable of amplification with emphasis on vacuum tubes and their circuits as applied to communication and control engineering.

6715 **Transistor Audio Amplifiers.** Richard F. Shea. 219 p. 1955. John Wiley & Sons, New York. (QC544.T3 Sh31t)

Fundamentals of transistor applications; typical circuits; design of amplifiers to meet special requirements.

6716 **Telecommunications.** A. T. Starr. 454 p. 1954. Sir Isaac Pitman & Sons, London. (TK5101 St28t)

A presentation of the mathematical methods of both Fourier analysis and operational calculus, and a short account of microwave technique and wave guide theory.

6717 **Basic Circuitry of the MIDAC and MIDSAC.** J. E. De Turk, H. L. Garner, J. Kaufman, H. W. Bethel, and R. E. Hock. 106 p. 1954. University of Michigan Engineering Research Institute, Ypsilanti. (TK7872.C5 Mb58b)

Details of flexible and highly standardized circuits for computer design. Circuit diagrams, photographs, tables, graphs. 5 ref.

See also:

6226 (glass to metal seals)
6241 (electrical analogs for heat transfer problems)
6369 (organic semiconductors)
6783 (electronics in photographic processes)
6849 (electronic computers)
6864 (high vacuum in industry)
6923 (zone melting of semiconductors)
7041 (trapping of minority carriers in Si)
7083 (semiconducting properties of Constantan and Manganin)
7272 (statistics in radio techniques)

ENGINEERING ECONOMICS

6718 **Changing Times for Glycerine.** E. Scott Pattison. *American Paint Journal*, v. 39, Feb. 21, 1955, p. 77-78, 80-81.

Recent market survey in glycerine. Graphs.

6719 **New Look at Economics of Pricing.** S. C. Schuman. *Chemical Engineering*, v. 62, Mar. 1955, p. 180-182.

Correlates prices of chemicals with production. Graphs. 4 ref.

6720 **Finally, a Brighter Outlook for Textiles.** William H. Chartener. *Chemical Engineering*, v. 62, Mar. 1955, p. 256, 258, 260.

Prospects for 1955. Graph.

6721 **Fabrication Costs of Steel Piping.** Norman G. Bach. *Chemical Engineering Costs Quarterly*, v. 5, Jan. 1955, p. 17-22.

Includes diagram, graphs.

6722 **Trends in the Expansion of the Chemical Industry.** Henry Groppe. *Chemical Engineering Progress*, v. 51, Feb. 1955, p. 81F-84F.

Aspects of location for chemical plants. Tables, graphs, map. 5 ref.

6723 **Can Power Keep Up?** *Chemical Week*, v. 76, Feb. 19, 1955, p. 56-60.

Capacity generation for the next 3 yrs. is predicted to meet demand. Graphs.

6724 **Metals—Review and Forecast. Gold. Titanium. Silver. Aluminum. Magnesium. Copper. Zinc. Lead. Uranium. Tin. Mercury.** M. A. Kriz, Thomas W. Lippert, Francis H. Wemple, Irving Lipkowitz, J. D. Hanawalt, Hans H. Wanders, Charles R. Ince, Robert L. Ziegfeld, Robert D. Nininger, George H. Cleaver, and Helena M. Meyer. *Engineering and Mining Journal*, v. 156, Feb. 1955, p. 75-95.

Includes tables, graphs.

6725 **Nonmetallics—Review and Forecast. Sulphur. Phosphate. Asbestos. Vermiculite. Barite. Perlite. Feldspar. Fluorspar. Mica. Potash.** Langbourne M. Williams, H. F. Dengler, Walter A. Rukeyser, Walter S. Steele, Reginald Rowand, S. W. Johnson, Brooke L. Gunsallus, John E. Holtzinger, Waldemar F. Dietrich and G. T. Harley. *Engineering and Mining Journal*, v. 156, Feb. 1955, p. 107-118.

Includes tables.

6726 **The Glass Industry—1954.** H. E. Simpson. *Glass Industry*, v. 36, Feb. 1955, p. 75-82, 110.

Survey of production, markets, raw materials, and research. Tables.

6727* **Looking Ahead in Uranium.** W. B. Hall. *Mines Magazine*, v. 45, Jan. 1955, p. 16, 36, 46.

Possibilities of future growth in the U industry.

6728 **Metalworking Moves Into Southeast.** *Steel*, v. 136, Feb. 28, 1955, p. 65-67.

Increase in manufacturing employment. Table, map, photograph.

Books and Miscellaneous Publications

6729 **Minerals in World Industry.** Walter H. Voskuil. 324 p. 1955. McGraw-Hill, New York. (HD9506 V92m)

A comprehensive treatment of the significance of minerals in economic productivity including ferrous and non-ferrous metals, fuels, plant-food minerals, and their relation to the establishment and maintenance of a high standard of living.

6730 **Principles of Mass and Flow Production.** Frank G. Woollard. 195 p. 1954. Iliffe Sons, London. (TS155 &W88p)

Principles relating to the setting up of a flow production plant and the implication of each; methods employed can be adapted for any size plant without large capital.

See also:

6633 (cost control in metal finishing)
6867 (economic importance of Al pistons)
6870 (market for Ti)
6872 (review forecast on ferro-alloy metals)
6873 (review and forecast on minor metals)
7421 (welding costs)

FLUID MECHANICS

6731 **Steady Rotational Flow of an Incompressible, Viscous Fluid Enclosed Between Two Coaxial Cylinders.** S. Skavlem and S. Tjötta. *Acoustical Society of America, Journal*, v. 27, Jan. 1955, p. 26-33.

Theoretical study of two-dimensional flow. Graphs, photograph. 6 ref.

6732 **Disentangling Turbulence.** Max M. Munk. *Aero Digest*, v. 70, Feb. 1955, p. 27-29.

New theory for turbulent flow concerned mainly with "lumps" elements of the fluid. Diagrams.

6733 **Pulsating-Flow Measurement—A Literature Survey.** A. K. Oppenheim and E. G. Chilton. *ASME, Transactions*, v. 77, Feb. 1955, p. 231-245; disc., p. 245-248.

Fundamental aspects; effects of flow systems on meters. Diagrams, graphs. 92 ref.

6734* **A Theoretical and Experimental Study of Shock-Tube Flows.** I. I. Glass and G. N. Patterson. *Journal of the Aeronautical Sciences*, v. 22, Feb. 1955, p. 73-100.

Integrated account of the shock tube. Graphs, tables, photographs. 24 ref.

6735 **A Note on Secondary Flow in Rotating Radial Channels.** James J. Kramer and John D. Stanitz. *U. S. National Advisory Committee for Aeronautics, Report* 1179, 1954, 12 p. (TL521 Un3r)

A general vector differential equation for vorticity component parallel to a streamline. Diagrams, table, graphs. 7 ref.

6736 An Evaluation of Non-Newtonian Flow in Pipe Lines. Ruth N. Weltmann. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3397, Feb. 1955, 40 p. (TL570 Un3t)

Includes tables, graphs. 16 ref.

See also:

6132 (fluid mechanics in aeronautics)

FOOD TECHNOLOGY

6737 Consistency Changes in Global Spread Caused by Tempering. N. N. Hellman, H. F. Zobel, and F. R. Senti. *American Oil Chemists' Society, Journal*, v. 32, Feb. 1955, p. 110-114.

Tempering limits crystal growth. Tables, graph, micrographs, X-ray diffraction pattern. 9 ref.

6738* Gamma Ray Sterilization of Canned Meat Previously Inoculated With Anaerobic Bacterial Spores. Lloyd L. Kempe, J. T. Graikoski, and R. A. Gillies. *Applied Microbiology*, v. 2, Nov. 1954, p. 330-332.

Dosages for various concentrations of spores. Graphs, tables. 9 ref.

6739* Appraisal of Certain Methods for Evaluation of Ham Quality. H. T. Fredeen, G. H. Bowman, and J. G. Stothart. *Canadian Journal of Agricultural Science*, v. 35, Jan.-Feb. 1955, p. 91-94.

Methods of predicting quantities of fat, lean meat, and bone. Tables. 3 ref.

6740 Review of Status and Problems of Radiation Preservation of Foods and Pharmaceuticals. Samuel A. Goldblith and Bernard E. Proctor. *Journal of Agricultural and Food Chemistry*, v. 3, Mar. 1955, p. 253-256.

Effects of ionizing radiations on foods, vitamins, amino acids, enzymes, organic compounds of biological importance, and microorganisms. Tables, graphs. 17 ref.

6741* Flour Under the Electron Microscope. New Information on Dough-Forming Properties. **Mehl unter dem Elektronenmikroskop, Neue Erkenntnisse über die Ursachen des Teigbildungsvermögens.** (German.) Kurt Hess. *Umschau in Wissenschaft und Technik*, v. 55, no. 4, Feb. 15, 1955, p. 114-116.

Determination of water-absorbing power and baking qualities of wheat flour by isolating its proteins and other components, and observing their structures and properties. Micrographs, graphs. 12 ref.

See also:

6469 (hydrogenation of triglycerides)
6590 (corrosion of tinplate by foods)
6864 (high vacuum in industry)
6890 (stainless steel for food processing equipment)
7263 (food preservation by ultra-violet radiation)

FUELS AND COMBUSTION

6742 Effect of Diluents on Burning Velocities in Hydrogen-Bromine Mixtures. M. C. Huffstutler, Jas. A. Rode, and Robbin C. Anderson. *American Chemical Society, Journal*, v. 77, Feb. 5, 1955, p. 809-810.

Effects of N_2, A, and He. Table, graph. 7 ref.

6743* Effect of Inhomogeneity on the Radiation of Luminescent Flames. **Einfluss der Inhomogenenität auf die Strahlung leuchtender Flammen.** (German.) Werner Pepperhoff and Günter Grass. *Archiv für das Eisenhüttenwesen*, v. 26, no. 1, Jan. 1955, p. 9-18.

Local differences in the true flame temperature and of the absorption capacity on the measured mean temperature and radiation values. Graphs. 9 ref.

6744* Physico-Chemical Problems of Carbonization. **Physikalisch-chemische Probleme der Inkohlung.** (German.) G. Huck and J. Karweil. *Brennstoff-Chemie*, v. 36, nos. 1-2, Jan. 1955, p. 1-11.

Review of literature on the post mortem concentration of C in plants; N and S activity during carbonization; thermodynamic and kinetic considerations. Tables, graphs. 87 ref.

6745 High Temperature Reactions of Coal Minerals During Combustion. G. Whittingham. *British Coal Utilisation Research Association, Monthly Bulletin*, v. 18, Dec. 1954, p. 581-590.

Objective is economical recovery of inorganic chemicals. Graphs. 40 ref.

6746* Selective and Petrographic Preparation of Coals for Coking. **La préparation sélective et pétrographique des charbons en vue de leur cokéfaction.** (French.) E. Burstlein. *Chaleur & Industrie*, v. 36, no. 354, Jan. 1955, p. 14-28.

Discusses variations of the quality of coke; increasing productivity of coking plants and lowering production costs; and technical results using the Sovaco coking process. Graphs, tables.

6747 Transglycosylation of *N*-Arylglycosylamines. R. Bognár and P. Nánási. *Chemical Society, Journal*, 1955, Jan., p. 189-193.

Mechanisms are discussed. 8 ref.

6748 Effect of Solid Surfaces on the Propagation of Flame Through Ethylene-Air Mixtures. M. F. Hoare and J. W. Linnett. *Chemical Society, Journal*, 1955, Jan., p. 195-202.

Studies minimum tube diameter for propagation, flash-back flow rates, and combustion products. Diagram, graphs. 15 ref.

6749* Progress in the Gasification of High-Ash Fine-Grain Coal, Under Increased Pressure. **Fortschritte in der Vergasung von aschenreicher und feinkörniger Kohle unter erhöhtem Druck.** (German.) Otto Hubmann. *Chemie-Ingenieur-Technik*, v. 27, no. 2, Feb. 1955, p. 65-70.

Gas produced from low-grade coals has been made possible through the development of the "Lurgi pressure gasification" process. Diagrams, photographs, tables, graph. 10 ref.

6750* Physico-Chemical Interactions of Two Coals During Their Carbonization. **Interactions physicochimiques de deux charbons pendant leur carbonisation.** (French.) André Boyer, Simone Durif, and Boris Alpern. *Comptes rendus*, v. 239, no. 25, Dec. 20, 1954, p. 1791-1792.

Discusses problem of diffusion in the plastic state. 1 ref.

6751* The Effect ot the Diameter of the Tube Upon the Inflammability Limit of Normal Butane and Air Mixtures. **Influence du diamètre du tube sur les limites d'inflammabilité des mélanges de butane normal et d'air.** (French.) Gisèle Dalmai, Ralph Delbourgo, and Paul Laffitte. *Comptes rendus*, v. 240, no. 2, Jan. 10, 1955, p. 192-194.

Investigation of large variations of inflammability with varying tube diameters at below-atmospheric pressures. Graphs.

6752* Artificial Combustion at Low Temperature. **Sur l'inflammation artificielle à basse pression.** (French.) Pierre Dugleux, Eucène Fréling, Henri Guénoche, and Paul Laffitte. *Comptes rendus*, v. 240, no. 4, Jan. 24, 1955, p. 431-433.

Presents results using propane-air mixtures. Graphs. 5 ref.

6753* Ignition in a Layer of Powdered Coal. **Sur l'inflammation dans une couche de charbon en grains.** (French.) Marcel Vérnon and Le Trung Chinh. *Comptes rendus*, v. 240, no. 5, Jan. 31, 1955, p. 501-502.

Measurement made on coal heated in an electric furnace having a linearly programmed increasing temperature.

6754* Ignition of Gases in the Case of Different Types of Energy Exchange With the Surrounding Medium. **O vosplamenenii gazov pri razlichnykh formakh energeticheskogo obmena s okruzhaiushchei sredoi.** (Russian.) D. I. Abugov. *Doklady Akademii Nauk SSSR*, v. 100, no. 2, Jan. 11, 1955, p. 291-294.

Includes graph. 7 ref.

Fuels and Combustion

6755* **Additives Improve Distillate Fuels.** R. O. Bender and W. DeB. Bertolette. *Fueloil & Oil Heat*, v. 14, Mar. 1955, p. 63-66.

Types and effects of various additives for fuel oils. Tables, photographs. 7 ref.

6756* Coal-Grinding and -Mixing Plants. **Kohlen-Mahl- und Mischanlagen.** (German.) Fritz Wehrmann. *Gas- und Wasserfach*, v. 96, Ausgabe Gas, no. 3, Feb. 1, 1955, p. 75-78.

Effect on the quality of the coke; arrangement of equipment for large, medium, and small coking plants. Diagrams, graphs. 11 ref.

6757* Economic Utilization of Coke Fines in the Operation of Gas Plants and Experiences With a New Screening Mill. **Wirtschaftliche Verwertung von Koksgrus im Gaswerks-Betrieb und Erfahrungen mit einer neuen Grusmühle.** (German.) Vinzenz Jungeblut. *Gas-und Wasserfach*, v. 96, Ausgabe Gas, no. 3, Feb. 1, 1955, p. 78-83.

Utilization and methods of improving the fuel value of coke up to 10 mm. diameter; results of large-scale investigations. Tables, diagrams, photograph. 3 ref.

6758 Chromium Hexacarbonyl. II. Chromium Hexacarbonyl as a Fuel Additive. W. M. Cumming, J. A. Horn, and P. D. Ritchie. *Journal of Applied Chemistry*, v. 5, Jan. 1955, p. 39-52.

Explanation of anomalous behavior in gasoline and diesel fuels. Graphs, tables. 45 ref.

6759 Gaseous Detonation. VI. The Rarefaction Wave. G. B. Kistiakowsky and P. H. Kydd. *Journal of Chemical Physics*, v. 23, Feb. 1955, p. 271-274.

The density profile of the rarefaction wave which follows a detonation was determined using the technique of X-ray absorption measurements. Graphs. 12 ref.

6760* Contribution to the Instantaneous Measuring of Temperatures of Luminous Flames. **Contribution à la mesure instantanée des températures des flammes éclairantes.** (French.) G. Monnot. *Revue de l'institut français du pétrole et Annales des combustibles liquides*, v. 9, no. 12, Dec. 1954, p. 740-763.

Study of two-color pyrometry and its application to the diesel engine. Diagrams, tables, graphs, photographs. 39 ref.

6761 Analyses of Tipple and Delivered Samples of Coal (Collected During the Fiscal Year 1953). S. J. Aresco, C. P. Haller, and R. F. Abernethy. *U. S. Bureau of Mines, Report of Investigations* 5085, Jan. 1955, 82 p. (TN21 Un3r)

Classification of coals by type, size, source and analyses for composition, agglomerating and coking properties, calorific value, and other industrially important properties. Tables. 5 ref.

6762 The Effect of Temperature, Charge Density, and Blending on the Carbonization of Coal. F. W. Smith and D. A. Reynolds. *U. S. Bureau of Mines, Report of Investigations* 5110, Feb. 1955, 24 p. (TN21 Un3r)

Review of findings during 25 yrs. of research. Graphs. 14 ref.

6763 A Thermal Equation for Flame Quenching. A. E. Potter, Jr. and A. L. Berlad. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3398, Feb. 1955, 18 p. (TL570 Un3t)

Quenching distance is expressed in terms of thermal conductivity, fuel mole fraction, heat capacity, rate of rate-controlling reactions, geometry of quenching surface, and a constant. Table, graphs. 17 ref.

6764 Temperature-Composition Limits of Spontaneous Explosion for Nine Alkylsilanes With Air at Atmospheric Pressure. Rose L. Schalla and Glen E. McDonald. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3405, Feb. 1955, 15 p. (TL570 Un3t)

The Si-H bond appears more susceptible to oxidation than the C-H bond. Diagram, graphs. 9 ref.

6765 Chain Breaking and Branching in the Active-Particle Diffusion Concept of Quenching. Frank E. Belles and A. L. Berlad. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3409, Feb. 1955, 37 p. (TL570 Un3t)

The simple theory correlated all available propane quenching data. Tables, graphs. 19 ref.

6766* Modern Processing of Bituminous Coal in Western Germany. Dust Precipitation and Desludging. **Die gegenwärtige Steinkohlen-Aufbereitung in Westdeutschland. Staubabscheidung und Entschlämmung.** (German.) A. Götte. *VDI Zeitschrift*, v. 97, no. 4, Feb. 1, 1955, p. 97-104.

Review of classifying methods and equipment; description of the convertal process based on the differential behavior of certain oils towards coal, clay, or loams; methods of refuse disposal. Table, graph, photographs, diagrams. 11 ref.

6767* Generalized Equations of Combustion of a Carbon Channel. **Obobshchennye uravneniia goreniia uglerodnogo kanala.** (Russian.) S. P. Adamenko. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2081-2087.

Material balance of gases; determination of the intensity of diffusion currents and of the coefficient of neutralization. Graphs, diagram. 10 ref.

6768* Investigations of the Kinetics and Mechanics of the Vapor-Phase Oxidation of Aromatic Hydrocarbons. **Issledovaniia v oblasti kinetiki i mekhanizma parofaznogo okisleniia aromaticheskikh uglevodorodov. V.** Kinetics of Oxidation of Naphthalene on a Mixed Vanadium Catalyst. **Kinetika okisleniia naftalina na smeshannom vanadievom katalizatore.** (Russian.) I. I. Ioffe and Iu. G. Sherman. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2095-2106.

Mathematical analysis. Tables, graphs, sketches. 5 ref.

6769* Influence of Fractional Composition of Solvents on the Solubility of Humic and Sapropelitic Coals. **O vliianii fraktsionnogo sostava rastvoritelei na rastvorimost' gumusovykh i sapropelitovykh uglei.** (Russian.) M. K. D'iakova and V. V. Surovtseva. *Zhurnal Prikladnoi Khimii*, v. 28, no. 1, Jan. 1955, p. 65-70.

The selective effects of various organic solvents.

Books and Miscellaneous Publications

6770 Coal. **Die Kohle.** (German.) Wilhelm Gumz and Rudolf Regul. 427 p. 1954. Verlag Glückauf G.m.b.H., Essen. (TN800 G95k)

Geophysics and distribution; properties; economic importance; mining and processing methods; uses; coal and coke combustion; heater and furnace design; distillation products; definition of terms.

6771 Hauck Industrial Combustion Data. 3rd Ed. 168 p. 1953. Hauck Manufacturing Co., Brooklyn. (TH7121 H29h3)

Handbook presenting practical information for determining the proper selection, installation, and methods of operating combustion equipment.

6772 Energy Transfer in Hot Gases. National Bureau of Standards Circular 523. 126 p. 1954. U. S. Government Printing Office, Washington, D. C. (QD516 Un3.5e)

Spectra of flames and various combustion products; theory of flames; temperatures of various flames; energy distributions.

See also:

6134 (fuel tank explosions)
6331 (fuel testing)
6417 (cold flame oxidation of acetaldehyde)
6477 (coking of tars and pitches)
6947 (evaluation of coke)

GEOLOGY AND MINERALOGY

6773* **The Release of Oil From Petroleum-Bearing Materials by Sulfate-Reducing Bacteria.** D. M. Updegraff and Gloria B. Wren. *Applied Microbiology*, v. 2, Nov. 1954, p. 309-322.

Tests indicate that presently known strains are not practical for secondary recovery of oil. Tables, graph. 16 ref.

6774* **Air Photo Criteria of Ore Localization in the Corbin-Wickes Mining District, Jefferson County, Montana.** W. S. Levings and K. S. Herness. *Mines Magazine*, v. 45, Jan. 1955, p. 17-22.

Use of air photographs in locating ore bodies. Diagram, photographs, map. 4 ref.

6775 Investigation of the Littleton Ridge Manganese Deposit and Vicinity, Southern District, Aroostook County, Maine. N. A. Eilertsen. *U. S. Bureau of Mines, Report of Investigations* 5104, Feb. 1955, 39 p. (TN21 Un3r)

Extent and nature of low grade manganese minerals; possibilities of recovery by leaching. Maps, photographs, tables. 11 ref.

6776 A New Method of Determining Variations in Physical Properties of Oil in a Reservoir, With Application to the Scurry Reef Field, Scurry County, Tex. Alton B. Cook, G. B. Spencer, F. P. Bobrowski, and Tim Chin. *U. S. Bureau of Mines, Report of Investigations* 5106, Feb. 1955, 47 p. (TN21 Un3r)

Correlation of properties and deposit depth to aid in calculating material balances. Graphs, tables.

6777 Estimate of Known Recoverable Reserves of Coking Coal in Washington County, Pa. Joseph J. Wallace, James J. Dowd, John M. Provost, R. F. Abernethy, and D. A. Reynolds. *U. S. Bureau of Mines, Report of Investigations* 5109, Feb. 1955, 23 p. (TN21 Un3r)

Includes maps, tables. 13 ref.

Books and Miscellaneous Publications

6778 Nuclear Geology. Henry Faul, editor. 414 p. 1954. John Wiley & Sons, New York. (QC806 N88)

A simple introduction to nuclear physics and its applications to geological problems.

See also:

7292 (age of Pb ores)
7298 (geology of Sb ore)

GEOPHYSICS

6779 Storms in the Ionosphere. Edward Appleton. *Endeavour*, v. 14, Jan. 1955, p. 24-28.

Exploration and effects. Graphs. 8 ref.

6780* Absorptive Properties of Water Vapor and Carbon Dioxide in the Atmosphere. **O pogloshchatel'nykh svoistvakh vodianogo para i uglekislogo gaza v atmosfere.** (Russian.) E. M. Feigel'son. *Izvestiia Akademii Nauk SSSR, Seriia Geofizicheskaia*, 1955, no. 1, Jan.-Feb., p. 69-79.

Experimental data by Kuznetsov's method. Models of absorption spectrum adapted to theory of radiation. Tables, graphs. 9 ref.

Books and Miscellaneous Publications

6781 Astrophysics. Nuclear Transformation, Stellar Interiors, and Nebulae. Lawrence H. Aller. 291 p. 1954. The Ronald Press, New York. (QB461 AL54a)

Fundamentals and major modern developments in the study of nuclear transformations; structures and origins of stars; origin of the elements.

See also:

6192 (photosynthesis in algae)
6312 (spectroscopy for study of atmospheric transparency)

GRAPHIC ARTS

6782 Effect of Ultrasonic Energy Applied During the After-Ripening Stage of Photographic Emulsion Preparation. Richard C. Herold, J. Byron Jones, and Charlotte D. Knighton. *Acoustical Society of America, Journal*, v. 27, Jan. 1955, p. 9-12.

Mechanism of increased photographic sensitivity. Diagram, tables, graphs. 3 ref.

6783* **Electronics Aid Photographic Processing and Manufacture.** D. T. R. Dighton. *Communications and Electronics*, v. 2, Mar. 1955, p. 44-48.

Applications of photo-electric devices in production of sensitized materials and cameras. Photographs. 23 ref.

6784* **Research Finds Answers to Gravure Problems.** Donald J. Byers. *Gravure*, v. 1, Mar. 1955, p. 24-25.

Reports progress in research at Battelle Memorial Institute sponsored by Gravure Research, Inc. Improved procedures were developed for sensitizing, tissue exposure, and etching.

6785 Photographic Granularity and Graininess. VIII. A Method of Measuring Granularity in Terms of the Scanning Area Giving a Threshold Luminance Gradient. L. A. Jones, G. C. Higgins, and K. F. Stultz. *Optical Society of America, Journal*, v. 45, Feb. 1955, p. 107-112.

Includes graphs, table. 8 ref.

6786 The Relation of Definition to Sharpness and Resolving Power in a Photographic System. George C. Higgins and Robert N. Wolfe. *Optical Society of America, Journal*, v. 45, Feb. 1955, p. 121-129.

Factors influencing quality of photographic negatives. Graphs, diagrams, photographs, table. 7 ref.

6787* **The Chapman Printing Smoothness Tester. I. Basic Development and Recent Modifications. II. Instrument Variables and Some Results of Application. III. Design and Use of a Direct Reading Tester.** S. M. Chapman, G. R. Sears, J. A. Van Den Akker, M. H. Aprison, N. J. Beckman, C. W. Denzer, and D. Noel Obenshain. *Tappi*, v. 38, Feb. 1955, p. 90-114.

Includes tables, diagrams, photographs, graphs. 16 ref.

6788* Sensitizing Absorption and Photochemical Reaction Products in Silver Bromide During Irradiation. **Sensibilisierende Absorption und photochemische Reaktionsprodukte im Silberbromid während der Bestrahlung.** (German.) G. Seiffert and O. Stasiw. *Zeitschrift für Physik*, v. 140, no. 1, 1955, p. 97-105.

Low-temperature experiments on irradiated Ag halides with Ag_2S addition reveal reduction of absorption. Importance of ionic and electronic processes in formation of different reaction products. Graphs. 11 ref.

6789* Some Properties of Ultrafine Grained Photographic Emulsions With Special Consideration of the Weigert Effect. **Einige Eigenschaften ultrafeinkörniger photographischer Emulsionen unter besonderer Berücksichtigung des Weigert-Effektes.** (German.) Hermann Mester. *Zeitschrift für wissenschaftliche Photographie, Photophysik und Photochemie*, v. 49, nos. 7-12, 1954, p. 137-219.

Preparation and experimental investigation of properties by electron microscopic, and X-ray and electron-diffraction methods. Tables, micrographs, diagrams, graphs, X-ray, recordings. 90 ref.

6790* Optically Sensitized Photolysis of Silver Bromide. **Zur optisch sensibilisierten Photolyse des Bromsilbers.** (German.) Georg Eckert. *Zeitschrift für wissenschaftliche Photographie, Photophysik und Photochemie*, v. 49, nos. 7-12, 1954, p. 220-249.

Photoelectric behavior of typical optical sensitizers; measurement of quantum yield of Becquerel effect; calorimetric determination of heat effects. Diagrams, graphs, tables. 64 ref.

6791* Sensitivity of the Positive Film. **Zur Empfindlichkeit von Positivfilm.** (German.) Rolf Görisch. *Zeitschrift für wissenschaftliche Photographie, Photophysik und Photochemie*, v. 49, nos. 7-12, 1954, p. 249-261.

Proposes method and technique of measuring sensitivity. Graphs, tables. 7 ref.

HEAT POWER

6792 Effect of Heavy Rainfall on Turbojet Aircraft Operation. James W. Useller, William Lewis, and Eugene V. Zettle. *Aeronautical Engineering Review*, v. 14, Feb. 1955, p. 40-42.

Effects of injested water on turbine life and operation. Graphs, table. 2 ref.

6793 Development of Pressurizing, Combustion, and Ash Separation Equipment for a Direct-Fired, Coal-Burning, Gas Turbine Locomotive. J. I. Yellott, P. R. Broadley, W. M.

Heat Power

Meyer, and P. M. Rotzler. *American Society of Mechanical Engineers, Paper No.* 54-A-201, 1954, 37 p. (TJ1 Am35p)

Summary report of research by eight different research centers on "feeding pulverized coal to a pressurized combustor, burning the coal efficiently under pressure within locomotive-space limitations, and removing flyash from compressed, heated air to the extent needed to prevent blade erosion". Tables, photographs, drawings, graphs. 30 ref.

6794 A Novel Cooling Method for Gas Turbines. Edward Burke and G. A. Kemeny. *ASME, Transactions*, v. 77, Feb. 1955, p. 187-194; disc., p. 194-195.

Coolant is sprayed directly on blades; effects on cycle efficiency. Diagrams, graphs, photographs. 23 ref.

6795 The Free-Piston-and-Turbine Compound Engine—A Cycle Analysis. A. L. London. *ASME, Transactions*, v. 77, Feb. 1955, p. 197-207; disc., p. 207-210.

Unique characteristics; importance of component losses. Diagrams, graphs, tables. 10 ref.

6796* Effect of Fuels on the Wear of Cylinders and Piston Rings in Internal Combustion Engines. **Über den Einfluss von Kraftstoffen auf den Verschleiss der Zylinderlaufbahnen und Kolbenringe von Ottomotoren.** (German.) H. Schildwächter. *Brennstoff-Chemie*, v. 36, nos. 3-4, Feb. 9, 1955, p. 44-54.

Experimental study of the effect of type of gasoline, S, alcohol content, and properties of lubricating oils on engine wear. Graphs, tables, diagram. 12 ref.

6797* Distribution of Normal Combustion in Spark-Ignition Engines. **Sur la dispersion de la combustion normale dans les moteurs à allumage commandé.** (French.) Rostislav Vichnievsky and Bernard Salé. *Comptes rendus*, v. 239, no. 25, Dec. 20, 1954, p. 1775-1777.

Considers a single cylinder with a compression ratio of 6.5 at full intake under industrial conditions. Graph. 2 ref.

6798* Plant Experiences With Radiation Superheaters. **Betriebserfahrungen mit Strahlungsüberhitzern. II.** (German.) H. Taubert. *Energietechnik*, v. 4, no. 12, Dec. 1954, p. 541-543.

Temperature measurements of superheater pipes to determine the effect of excessive temperatures and preventive measures. Diagrams, graphs.

6799* Pulsating-Combustion Gas Turbines. F. H. Reynst. *Institute of Fuel, Journal*, v. 28, Feb. 1955, p. 63-68, 80.

Method of combining pulsating combustion chambers with continuous-flow compressors and turbines. Diagrams, graphs.

6800* Radiation Heat Exchange in Cooled Combustion Chambers of Gas Turbines. **Luchistyi teploobmen v okhlazhdaemykh kamerakh goreniia gazovykh turbin.** (Russian.) S. N. Shorin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1954, no. 10, Oct., p. 99-111.

Mathematical solution. Diagrams. 2 ref.

6801 Free-Piston Gas-Turbine Prime Movers. A Review of Basic Principles. A. J. Ehrat. *Mechanical Engineering*, v. 77, March 1955, p. 212-216.

Includes diagrams, photographs. 9 ref.

6802 Thermal Design of Shell-and-Tube Heat Exchangers for Liquid-to-Liquid Heat Transfer. A. C. Mueller. *Purdue University Engineering Bulletin, (Engineering Experiment Station Research Series No.* 121), v. 38, Sept. 1954, 105 p. (TA21 P97.2r)

Includes diagrams, graphs, tables. 49 ref.

6803* Selection of Fuels for Commercial Turbine Powered Aircraft. C. R. Johnson, E. R. Kennedy, and W. S. Little. *Shell Aviation News*, 1954, no. 198, Dec., p. 7-11.

Factors to be evaluated. Table, graphs. 6 ref.

6804 National Motor-Gasoline Survey—Summer 1954. O. C. Blade. *U. S. Bureau of Mines, Report of Investigations* 5111, Jan. 1955, 24 p. + 1 plate. (TN21 Un3r)

Properties of motor gasolines sold in summer of 1954; trend of most important characteristics. Tables, graphs, map.

6805* The Walter Process, a Process of Producing Motive Power. Fuels and Thermodynamic Principles. **Das Walter-Verfahren, ein Verfahren zur Gewinnung von Antriebsenergie Treibstoffe und thermodynamische Grundlagen.** (German.) E. Kruska. *VDI Zeitschrift*, v. 97, no. 3, Jan. 21, 1955, p. 65-70.

Hot and cold process for producing power for rockets and turbines; properties of H_2O_2; combustion of hydrocarbons and self-igniting fuels with H_2O_2. Graphs, tables.

Books and Miscellaneous Publications

6806 Gas Turbines and Their Problems. Hayne Constant. Rev. Ed. 160 p. 1953. Todd Publishing Group, London. (TJ778 C76g2)

Theoretical, technical, and production problems; present and future applications in transportation, industrial plants, and power stations.

See also:

6216 (ceramic components for jet engines)
6848 (fuel pump for jet engine)
7332 (engineering dynamics of turbines and engines)

INFORMATION—PREPARATION AND DISSEMINATION

6807 Logic for Literature. *Chemical Week*, v. 76, Mar. 5, 1955, p. 40-41.

Description of method of indexing chemical patents.

Books and Miscellaneous Publications

6808 Development of a Record Form for Evaluating Research Through the Report. James W. Altman and Mahlon V. Taylor, Jr. 41 p. 1954. American Institute for Research, Pittsburgh. (Q180 A179d)

Development of a new instrument useful to persons responsible for determining the effectiveness of research knowledge communicated in professional journals.

6809 The Communication of Specialized Information. Margaret E. Egan, editor. 128 p. 1954. American Library Association, Chicago. (Z1001 Eg14c)

Ten papers covering the collection, storing, and dissemination of technical reports and similar documents.

6810* Automatic Control Bibliography. Warren F. Wade and Emory N. Kemler. 331 p. 1955. Summary Reports, Spring Park, Minn. (ZTA165 W11a)

A summary of American and English literature since 1900.

See also:

7285 (representation of technical data)

INSTRUMENTATION AND LABORATORY APPARATUS

6811* A New Method of Determining Small Osmotic Pressures. I. Principle and Apparatus. II. Measurements and Results. (English.) Stig Claesson and Gunnar Jacobsson. *Acta Chemica Scandinavica*, v. 8, no. 10, 1954, p. 1835-1850.

Includes photographs, tables, graphs, diagrams. 24 ref.

6812 Continuous Detection and Measurement of Low Concentrations of Oxygen in Gases. Leonard P. Pepkowitz. *Analytical Chemistry*, v. 27, Feb. 1955, p. 245-248.

The modified General Electric continuous dew point recorder is sensitive to 0.0005 vol. % of O in N, He, H, and CO_2. Tables, graphs, photographs. 3 ref.

6813 Determination of Specific Surface of Sieve-Size Powders. Bernard Dubrow and Mary Nieradka. *Analytical Chemistry*, v. 27, Feb. 1955, p. 302-305.

Instrument adaptable to rapid routine measurement. Diagrams, table, photographs, nomograms. 5 ref.

6814* Study of an Ultrasonic Energy Detecting Apparatus. **Étude d'un palpeur d'énergie ultrasonore.** (French.) Maurice Degrois. *Annales des Télécommunications*, v. 10, no. 1, Jan. 1955, p. 2-7.

Device measures energy absorption by temperature change in a picene element using a two-junction thermocouple. Diagrams, graphs, tables. 7 ref.

6815* Instrument Converter With Voltage, Current, and Torque Compensation. **Messumformer mit Spannungs-, Stromund Drehmoment-Kompensation.** (German.) L. Brandenburger. *Archiv für technisches Messen*, 1955, no. 228, Jan., p. 11-14.

Circuits and control mechanisms for the automatic compensation of electrical measuring instruments. Circuit diagrams, table. 3 ref.

6816* The Accuracy of Optical Pyrometers. **Die Messgenauigkeit von Teilstrahlungspyrometern. II.** (German.) Joachim Euler. *Archiv für technisches Messen*, 1955, no. 228, Jan., p. 19-20.

Sources of error and methods of compensating for them. Tables.

6817* Limits in the Design of Measuring Instruments. **Der Grenzfall bei der Konstruktion von Messgeräten.** (German.) H. Pöschl. *Archiv für technisches Messen*, 1955, no. 229, Feb., p. 9-12.

Determination and recognition of maximum improvements in instruments and parts; necessity of overcoming these limitations by resorting to new principles of design. Diagrams, photograph.

6818* The Strain-Gage Process. **Das Dehnungsmesstreifen-Verfahren. IV.** Electrical Measuring Technique. **Elektrische Messtechnik.** (German.) Chr. Rohrbach. *Archiv für technisches Messen*, 1955, no. 229, Feb., p. 41-44.

Basic circuits for measuring stresses with a.c. and d.c. Diagrams. 11 ref.

6819* **A Sensitive Temperature and Humidity Probe.** I. C. McIlroy. *Australian Journal of Agricultural Research*, v. 6, Jan. 1955, p. 196-199 + 1 plate.

Based on moist all dry Pt resistance thermometers; self powered. Circuit diagram, photographs. 2 ref.

6820 The Measurement of Gloss With Special Reference to Ceramic Materials. A. Dinsdale and F. Malkin. *British Ceramic Society Transactions*, v. 54, Feb. 1955, p. 94-112.

Includes diagrams, photograph, tables, micrographs, graphs. 3 ref.

6821 An Adiabatic Calorimeter for the Temperature Region Below 20° K.—The Specific Heat of Sodium Chloride. J. A. Morrison, D. Patterson, and J. S. Dugdale. *Canadian Journal of Chemistry*, v. 33, Feb. 1955, p. 375-382.

Cooled by conducting heat along lead wires. Graphs, diagram. 14 ref.

6822* Calibration of Gamma-Ray Diagrams. **Zur Eichung von Gammastrahl-Diagrammen.** (German.) E. Blum. *Erdöl und Kohle*, v. 8, no. 1, Jan. 1955, p. 5-6.

Prerequisites for establishing a zero line and calibration of deflections for stratigraphic purposes. Diagrams. 4 ref.

6823* Accurate Temperature Measurements in Metal Melts. **Genaue Temperaturmessungen in Metallschmelzen.** (German.) Erwin Samal. *Giesserei*, v. 42, no. 2, Jan. 20, 1955, p. 36-37.

Advantages of immersion thermocouples over optical pyrometers; design, circuit, and operation of an accurate portable temperature-measuring instrument. Diagrams. 4 ref.

6824* New, High-Capacity Laboratory Centrifuges. **Über neue, leistungsfähige Laboratoriums-Zentrifugen. I.** (German.) E. Wiedemann. *Helvetica Chimica Acta*, v. 38, no. 1, Feb. 1955, p. 37-46.

Design, advantages, operation, and applications. Diagrams, graphs, photographs. 8 ref.

6825* The Present Status of High Pressure Measurement and Control. I. Wilfred H. Howe. *ISA Journal*, v. 2, Mar. 1955, p. 77-79.

Review of equipment and its operation. Photographs, graphs.

6826* An Improved Reflection Type Electron Microscope. Kazuo Itō, Tsugio Itō, and Masaru Watanabe. *Journal of Electronmicroscopy*, v. 2, no. 1, 1954, p. 10-14.

Image and diffraction patterns, due to reflected electrons, are obtained by using deflection coils, a special specimen chamber mechanism and a three-stage magnetic lens system. Micrographs, diagrams, graph, photograph. 5 ref.

6827* Comparative Investigations of Layer-Thickness Measuring Processes. **Vergleichende Untersuchungen von Schichtdicken-Messverfahren.** (German.) Herbert Barghoorn. *Metalloberfläche*, Ausgabe B, v. 7, no. 2, Feb. 1955, p. 20-25.

Destructive and nondestructive methods of measuring the thicknesses of deposits on metals; sources of error. Diagrams, tables, graph. (To be continued.)

6828* The Visibility of the Interferences of the Twyman Interferometer. **Die Sichtbarkeit der Interfernzenm beim Twyman-Interferometer.** (German.) G. Hansen. *Optik*, v. 12, no. 1, 1955, p. 5-16.

Numerical relationship between greatest admissible aperture diaphragm and geometrical conditions of light paths; derivation and validity of mathematical formulas. Diagrams, tables, graph. 16 ref.

6829* New Optical Recording Measuring Instruments. **Neue registrierende optische Messgeräte.** (German.) H. Plesse. *Optik*, v. 12, no. 1, 1955, p. 29-40.

Descriptions of an extinction recorder, refractograph, and recording spectrophotometer. Diagram, photograph, graphs. 18 ref.

6830* Instrumentation and Automatic Control in Oil Refineries. III. Pneumatic Recorders and Controllers. E. H. W. Banner. *Petroleum*, v. 18, Mar. 1955, p. 91-98.

Includes photographs, diagrams, graph. (To be continued.)

6831* Electronic Temperature Controller. Alvin B. Kaufman. *Radio-Electronic Engineering*, v. 24, Mar. 1955, p. 10-11, 30-31.

Special probe design and sensitive circuit gives control within 0.25 F. Photographs, circuit diagram. 2 ref.

6832 Recording Integrating Photoelectric and Radioactive Scanner for Paper Electrophoresis and Chromatography. E. L. Durrum and S. R. Gilford. *Review of Scientific Instruments*, v. 26, Jan. 1955, p. 51-56.

Includes diagrams, photograph, graphs. 23 ref.

6833 Friction Apparatus for Very Low-Speed Sliding Studies. F. Heymann, E. Rabinowicz, and B. G. Rightmire. *Review of Scientific Instruments*, v. 26, Jan. 1955, p. 56-58.

Device eliminates stick-slip vibration. Diagrams, charts. 5 ref.

6834* Temperature Control of Electric Heat-Treating Furnaces. **Temperaturregulierung von Elektroöfen zur Wärmebehandlung.** (German.) J. Horowitz. *Sprechsaal*, v. 88, no. 2, Jan. 1955, p. 23-26.

Operation principle for automatic controls; consideration of temperature of charge, furnace chamber, heating wires, and recorded temperature; accuracy of control; thermal potentials of precious and base metal thermocouples. Graphs, diagram. 2 ref. (To be continued.)

6835* The Aspiration Psychrometer as a Physical Measuring Instrument. **Des Aspirations-Psychrometer als physikalisches Messinstrument.** (German.) Otto Dinkelacker. *Zeitschrift für angewandte Physik*, v. 6, no. 12, Dec. 1954, p. 538-541.

Basic formulas on the basis of exchange, boundary-layer, and diffusion theories; development of equation for ideal psychrometer. Table. 15 ref.

6836* Theory of a Thermomagnetic Oxygen-Measuring Instrument. **Zur Theorie der thermomagnetischen Sauerstoffmessgeräte.** (German.) Helmar Krupp. *Zeitschrift für angewandte Physik*, v. 6, no. 12, Dec. 1954, p. 541-547.

Classification and mathematical description. Diagrams, graphs. 9 ref.

Instrumentation and Laboratory Apparatus

Books and Miscellaneous Publications

6837 The Handbook of Measurement and Control. M. F. Behar, editor. 2nd Ed. 216 p. 1954. The Instruments Publishing Co., Pittsburgh. (Q185 B39h2)

Designed to classify and outline operating principles and applications of laboratory, scientific, engineering, and industrial instruments.

See also:

6475 (thermal conductivity measuring)
6527 (vapor-pressure measurements)
6545 (strain measurement on enamels)
6628 (constant voltages and currents for testing purposes.)
6683 (advantages of electronic instrumentation)
6699 (transistor test set)
6733 (flow meters)
6760 (temperature measurement in flames)
6787 (tester for printing paper)
6845 (friction measuring)
6973 (temperature controls)
7078 (measuring specific heat)
7250 (X-ray spectrometer)
7366 (rheology of plastics)

LUBRICATION AND FRICTION

6838* Aluminum Alloys as Bearing Metals. **Aluminiumlegierungen als Lagermetalle.** (German.) E. Vaders. *Aluminium*, v. 31, no. 2, Feb. 1955, p. 55-57.

Requirements of bearing metals; development of new alloy for high thermal and mechanical stresses. Tables. 4 ref.

6839 The Closed-Circuit Lubrication System Applied to a Turbojet Aircraft Engine. R. G. Cunningham and P. H. Schweitzer. *American Society of Mechanical Engineers, Paper No.* 54–SA-1, 1954, 25 p. (TJ1 Am35p)

Change made to control oil aeration. Photograph, tables, graphs, diagrams. 6 ref.

6840* Bearing Material for Increased Loads and Temperatures. **Lagermateriaal voor hogere belastingen en temperaturen.** (Dutch.) J. W. A. Renssen. *Bedrijf en Techniek*, v. 10, no. 219, Jan. 15, 1955, p. 30-32, 46.

Theory of friction and wear; application to bearing surfaces; advantages of plastic and ceramic bearings. Micrographs, table.

6841* Oiliness of Lubricants in the Presence of Difluoro-Dichloromethane, as a Function of the Dielectric Constants and at Varying Pressures. **Étude de l'onctuosité des lubrifiants en présence de difluoro-dichlorométhane, en fonction des constantes diélectriques et à des pressions variées.** (French.) Grégoire Volovick and Henri Damany. *Comptes rendus*, v. 240, no. 3, Jan. 17, 1955, p. 302-304.

Includes graph, table. 4 ref.

6842 P.T.F.E.-Impregnated Dry Bearings. D. C. Mitchell and A. E. Burke. *Engineers' Digest*, v. 16, Feb. 1955, p. 53-58.

Methods of impregnating bronze bearings with polytetrafluorethylene. Testing procedures. Performance of bearings. Tables, graphs, photograph, diagram, micrographs. 9 ref.

6843* **Functions of Materials in Bearing Operation.** P. P. Love, P. G. Forrester, and A. E. Burke. *Institution of Mechanical Engineers, Automobile Division, Proceedings*, no. 2, 1953-1954, p. 29-39 + 4 plates; disc., p. 40-44.

Bearing design; factors affecting operation; selection of metals. Diagrams, photographs, micrographs, graphs. 16 ref.

6844* Molybdenum Disulfide in Lubricating Technique. **Molybdändisulfid in der Schmiertechnik.** (German.) F. W. Uhlmann. *Metall*, v. 9, nos. 3-4, Feb. 1955, p. 88-90.

Experimental results on MoS_2 used with and without other lubricants. Photographs. 5 ref.

6845 Apparatus for Studying Friction and Sliding Electrical Contacts. D. G. Flom. *Review of Scientific Instruments*, v. 26, Jan. 1955, p. 1-4.

Kinetic friction is recorded by a sensitive strain gage system. Photographs, diagram, graphs.

6846* Investigation of the Structure of Plastic Lubricants by the Electron Microscope. **Issledovanie struktury plastichnykh smazok v elektronnom mikroskope.** (Russian.) G. V. Vinogradov, N. A. Nechitailo, V. V. Sinitsyn, and V. I. Aleksashin. *Zhurnal Prikladnoi Khimii*, v. 28, no. 1, Jan. 1955, p. 52-64.

Includes micrographs. 16 ref.

Books and Miscellaneous Publications

6847 Aircraft Fuels, Oils, Induction and Related System. Michael V. Caponetti. 172 p. 1954. Boston University Press, Boston. (TL701 C17a)

Presents the basic principles of operation, construction, and maintenance of piston-type engine systems, with appropriate data on fuel and oil tests and specifications.

See also:

6833 (friction testing)
7010 (galling and seizing in bearings)

MECHANICAL ENGINEERING

6848 Air Driven Afterburner Fuel Pump Reduces System Weight. M. C. Toth. *Aero Digest*, v. 70, Feb. 1955, p. 58, 60.

Design and operation of turbine driven pump. Diagrams, photograph.

6849* Experiments With an Electrical Analogue for the Extension and Flexure of Flat Plates. P. J. Palmer and S. C. Redshaw. *Aeronautical Quarterly*, v. 6, Feb. 1955, p. 13-30.

Shows that a pure resistance network is practicable for solving some bending problems. Circuit diagrams, table, photographs, diagrams. 10 ref.

6850 Influence of "Automation" on Machine-Tool Design. F. R. Swanson. *American Society of Mechanical Engineers, Paper No.* 54-A-81, 1954, 8 p. (TJ1 Am35p)

Overall considerations and requirements for individual parts or subassemblies.

6851 Machine-Tool Automation. K. O. Tech. *American Society of Mechanical Engineers, Paper No.* 54-A-82, 1954, 6 p. + 2 plates. (TJ1 Am35p)

Design principles for detailed mechanisms. Photographs.

6852* Acceleration Control Device for Hydraulically Powered Motions. Donald L. Kingston. *Applied Hydraulics*, v. 8, Mar. 1955, p. 60-61.

Design of cam-operated acceleration deceleration valve. Graph, photograph.

6853* Operating Results of Air Turbines in Closed Circuit. **Résultats d'exploitation de turbines à air en circuit fermé.** (French.) D. Schmidt. *Chaleur & Industrie*, v. 36, no. 354, Jan. 1955, p. 29-34.

Present status of the Escher Wyss aerodynamic turbine and its future possibilities. Diagrams, photographs, graph.

6854 Compression Springs With Constant Force. E. H. Boerner. *Electrical Manufacturing*, v. 55, Mar. 1955, p. 137-139, 336.

Empirical design formulas for helical spring with nearly constant force. Photographs, diagrams, table.

6855 Stresses in Plates With Cracks and Notches. A Theoretical and Experimental Investigation. M. Rothman and D. S. Ross. *Engineering*, v. 179, Feb. 11, 1955, p. 175-180.

Mathematical analysis and photoelastic stress determinations. Graphs, photographs, diagrams. 10 ref.

6856* Fundamentals of Automation. **Automatiseringens grundelement.** (Swedish.) L. von Hámos. *Gjuteriet*, v. 44, no. 12, Dec. 1954, p. 205-211.

Survey of basic components; the functional structures of different control systems; practical industrial applications. Diagrams, photographs. 10 ref.

6857 Highway Research Board, Proceedings, (Annual Volume), v. 33, 1954, 563 p. Publication 324. National Academy of Sciences, National Research Council, Washington, D. C. (TE1 H53p)

Forty-four papers on economics, finance, and administration; design; materials and construction; maintenance; traffic and operations; soils.

6858 Hypo-Elasticity. C. Truesdell. *Journal of Rational Mechanics and Analysis*, v. 4, Jan. 1955, p. 83-133.

Theory. Analysis of stress-strain relationships. Graphs, diagrams.

6859 On the Concept of Concentrated Loads and an Extension of the Uniqueness Theorem in the Linear Theory of Elasticity. E. Sternberg and R. A. Eubanks. *Journal of Rational Mechanics and Analysis*, v. 4, Jan. 1955, p. 135-168.

Mathematical analysis. Theoretical considerations. Diagram. 22 ref.

6860 Hydraulics for High Horsepower Applications. M. A. Hayden. *Product Engineering*, v. 26, Feb. 1955, p. 129-134.

Sample calculations for these efficient, flexible systems. Tables, graph, photographs, diagrams.

6861 Analysis of Long Cylinders of Sandwich Construction Under Uniform External Lateral Pressure. Milton E. Raville. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1844, Nov. 1954, 23 p. + 5 plates. (TS800 Un3.3r)

Analysis is extended to include elastic instability. Diagrams. 7 ref.

6862* Oscillograms on the Strokes of Valves of High-Speed Compressors. **Huboszillogramme von Ventilen raschlaufender Verdichter.** (German.) F. Söchting. *VDI Zeitschrift*, v. 97, no. 3, Jan. 21, 1955, p. 72-76.

Principle and advantages of measuring motion of valves electrically with capacitance, linear-operating transmitters and H.F. carrier-current circuits. Diagrams, oscillograms. 7 ref.

6863* Compressed-Oil Operation of Tube and Bar Extrusion Pressses for the Processing of Heavy and Light Metals. **Drückölbetrieb für Rohr- und Strangpressen zur Verarbeitung von Schwer- und Leichtmetallen.** (German.) Ernst Müller. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 11-16.

Design and operation of high-power oil pumps whose advantages are reliability, simple packing design, and absence of corrosion. Photographs, drawings.

Books and Miscellaneous Publications

6864 High Vacuum in Industry. Marvin Grossman. 91 p. 1953. Harvard Graduate School of Business Administration, Cambridge, Mass. (QC166 G91h)

Investigates the most significant and promising advancements in vacuum equipment for coating, electronics, metallurgy, chemicals, petroleum, and food processes.

6865 Vibration Problems in Engineering. S. Timoshenko. 3rd Ed. 468 p. 1955. D. Van Nostrand Co., New York. (TA355 T48v3)

Systems with one, two, and several degrees of freedom; systems with non-linear and variable spring characteristics; vibrations of elastic bodies.

6866 A History of Mechanical Inventions. Abbott Payson Usher. Rev. Ed. 450 p. 1954. Harvard University Press, Cambridge, Mass. (Tl5 Us3h2)

Psychology of technological advance based on mechanical developments and related advances. Progress is traced mainly through the production and control of power.

See also:

6712 (control-system dynamics)
6864 (high vacuum in industry)
7003 (stress concentration factors)
7072 (stress analysis of cylindrical springs)

METALLURGY

6867* Light Alloy Piston and Its Importance for the Aluminum Industry. **Der Leichtmetallkolben und seine Bedeutung für die Aluminiumindustrie.** (German.) Ernst Mahle. *Aluminium*, v. 31, no. 2, Feb. 1955, p. 70-74.

Around 1,000,000 tons per yr. are used for piston production. Advances due to alloy developments. Photographs, table, micrographs, graph. 3 ref.

6868 American Institute of Mining and Metallurgical Engineers. Blast Furnace, Coke Oven and Raw Materials Committee, Proceedings, (Annual Volume), v. 13, 1954. 241 p. American Institute of Mining and Metallurgical Engineers, New York. (TN713 Am35p)

Fifteen papers on agglomeration, raw materials, coal, coke, and blast furnace theory and gas.

6869 Nak, a Versatile Alloy. *Chemical and Engineering News*, v. 33, Feb. 14, 1955, p. 648, 650.

Preparation, reactions, and technology of this unique alloy. Flowsheet, table, phase diagram.

6870 Where Is Titanium Headed? *Chemical Week*, v. 76, Feb. 19, 1955, p. 34 + 11 pages.

Reviews market, applications, and technology. Graphs, flowsheet.

6871 The Corrosion-Resisting High-Silicon Iron Alloys. J. Dodd. *Corrosion Technology*, v. 2, Feb. 1955, p. 37-42.

Production; properties; structure; application. Tables, micrographs, graph, photograph.

6872 Ferroalloy Metals—Review and Forecast. Cobalt. Molybdenum .Chromium. Tungsten. Nickel. Manganese. Norwood B. Melcher, Hubert W. Davis, Robert W. Geehan, Charles Katlin, and Gilbert L. DeHuff, Jr. *Engineering and Mining Journal*, v. 156, Feb. 1955, p. 96-101.

Includes tables.

6873 Minor Metals—Review and Forecast. Beryllium. Cadmium. Antimony. Arsenic. Bismuth. Platinum. Thorium. Rare Earth Metals. Selenium. Charles White Merrill, Horace T. Reno, Robert L. Mentch, Abbott Renick, James E. Bell, John E. Crawford, Frank D. Lamb, and John D. Sargent. *Engineering and Mining Journal*, v. 156, Feb. 1955, p. 102-106.

Includes tables.

6874* Cast Iron With Nodular Graphite as a Material for Mechanically, Thermally, and Chemically Stressed Castings. **Gusseisen mit Kugelgraphit als Werkstoff für mechanisch-, thermisch- und chemische-(MTC) beanspruchten Guss.** (German.) Helmut Timmerbeil. *Giesserei*, v. 42, no. 1, Jan. 6, 1955, p. 7-15.

Damping capacity of the graphite; improvement by thermal and chemical-thermal treatments; flame-hardening of surface to increase wear resistance; heat resistance and strength properties of alloyed nodular cast iron. Graphs, micrographs, photographs. 7 ref.

6875* Nodular Cast Iron—Its Present Position and Future Prospects as an Engineering Material, With Special Reference to Its Suitability for Crankshafts. S. B. Bailey. *Institution of Mechanical Engineers, Proceedings*, v. 168, no. 24, 1954, p. 643-657 + 12 plates; disc., p. 657-678.

Review of production, properties, and applications. Diagrams, photographs, micrographs, graphs, tables. 43 ref.

6876 A New Way to Control Arc Furnaces. Charles W. Vokac. *Iron and Steel Engineer*, v. 32, Feb. 1955, p. 76-81; disc., p. 81-91.

Automatic control with a rotary generator coupled to an air counterbalanced hydraulic electrode drive. Diagrams, photographs, oscillograph.

6877 Titanium—Its Progress and Applications. T. E. Perry and R. J. Garmy. *Iron and Steel Engineer*, v. 32, Feb. 1955, p. 98-105; disc., p. 105-106.

Review of Ti metallurgy. Applications in jet engines.

6878 General Physical Metallurgy of Titanium Reviewed. Robert I. Jaffee. *Journal of Metals*, v. 7, Feb. 1955, p. 247-252.

Review of alloying effects and possibilities; structures; improvements in mechanical properties. Graphs, tables, micrograph. 7 ref.

6879 Structural Design With Formed Aluminium Sheet. I. Cedric Marsh. *Light Metals*, v. 18, Feb. 1955, p. 57-59.

Metallurgy

Alloys available; economics of folded sections; design formulas. Table, graphs, diagrams. (To be continued.)

6880* Strength of Nodular Graphite Cast Iron. **Prochnost' chuguna s sharovidnym grafitom.** (Russian.) I. V. Kudriavtsev and N. B. Baranova. *Liteinoe Proizvodstvo,* 1954, no. 9, Dec., p. 6-10.

Compositions, mechanical properties, and conditions of heat treatment. Tables, graphs.

6881 Induction Heating. D. Warburton1Brown. *Machinery Lloyd (Overseas Ed.),* v. 27, Feb. 12, 1955, p. 88 + 9 pages.

Theory; equipment. Losses. Applications. Diagrams, photographs, tables, graphs.

6882 Titanium Alloy Extrusions Now Available. G. A. Moudry. *Materials & Methods,* v. 41, Feb. 1955, p. 86-87.

Advantages of extrusions over rolled shapes; properties. Photographs.

6883 Try Gray Irons. John L. Everhart. *Materials & Methods,* v. 41, Feb. 1955, p. 90-93.

Properties, applications, and cost advantages of various gray iron compositions. Photographs, table, graph.

6884* Computing the Specific Skin Resistance of a Compounded Melting Charge. **Die Berechnung des spezifischen Hautwiderstandes eines zusammengesetzten Heizgutes.** (German.) W. H. Scheibe. *Metall,* v. 9, nos. 3-4, Feb. 1955, p. 121-123.

Derivation of two formulas for computing the specific resistance of melt and conducting crucible in induction furnaces. Diagram, graph, table.

6885 Aluminium and Its Alloys in 1954. Some Aspects of Research and Technical Progress Reported. E. Elliott. *Metallurgia,* v. 51, no. 304, Feb. 1955, p. 65-74.

Review of published data. 125 ref.

6886 Aluminium in the Oil Industry. H. M. Bigford. *Metallurgia,* v. 51, no. 304, Feb. 1955, p. 75-80.

High thermal conductivity, lightness, and durability favor use of Al alloys in pipe lines and tanks. Welding characteristics, mechanical properties, and corrosion resistance. Tables, photographs, diagram.

6887 Aluminium in Electrical Engineering. J. C. Bailey. *Metallurgia,* v. 51, no. 304, Feb. 1955 p. 81-91.

Economic and technical advantages of use as cable conductors, sheathing, bus-bars, and windings. Tables, graph, photographs, diagram. 22 ref.

6888 Zinc and Its Uses: 1952-54. *Metallurgia,* v. 51, no. 304, Feb. 1955, p. 93-99.

Production and consumption of metal, alloys, and ZnO. Tables, photographs. 31 ref.

6889 Heat Resistant Cast High Alloys. C. K. Lockwood. *Product Engineering,* v. 26, Feb. 1955, p. 163-167.

Properties and applications of ACI class I (18 to 30% Cr), class II (18 to 32% Cr, 8 to 22% Ni), and class III (33 to 68% Ni, 10 to 21% Cr) alloys. Tables, graphs, photographs.

6890 Stainless at Work. Edward W. Hopper and E. A. Schoefer. *Steel,* v. 136, Feb. 21, 1955, p. 74-77.

Use of welded overlays to combat corrosion in paper pulping installations and all stainless construction in food processing equipment. Photographs, table.

6891 Turbines and Tomorrow's Metals. *Steel,* v. 136, Feb. 28, 1955, p. 88-90.

Demands for higher efficiencies and consequently higher operating temperatures impose difficult metallurgical problems. Photographs, graph.

6892 Thermenol. A Non-Strategic Aluminum-Iron Base Alloy for High Temperature Service. J. F. Nachman and W. J. Buehler. *U. S. Department of Commerce, Office of Technical Services,* PB 111530, June 1954, 14 p. (T21 Un3r)

Production techniques; control of grain structure; effects of impurities; mechanical and physical properties. Tables, photographs, diagrams.

6893* Choice of Structure of Steel for Parts Operating Under Cyclic Stresses. **O vybore struktury stali dlia detalei, rabotaiushchikh pri tsiklicheskikh nagruzkakh.** (Russian.) I. L. Mirkin and E. D. Tsypkina. *Vestnik Mashinostroeniia,* v. 35, no. 1, Jan. 1955, p. 72-75.

Medium carbon-low alloy steels have structures more resistant to fatigue than low carbon-high alloy steels. Tables, graphs, sketch. 2 ref.

6894* Metallurgical Principles Applied to Product Design. II. J. A. Burgard. *Western Machinery and Steel World,* v. 46, Feb. 1955, p. 104-105, 151.

Design of parts to be welded; wt. considerations; strength requirements. Diagrams.

Books and Miscellaneous Publications

6895 A Text-Book of Metallurgy. A. R. Bailey. 500 p. 1954. Macmillan & Co., London. (TN665 B1.5t)

Physical metallurgy and metal manufacture; melting, alloying, and casting practice; working and fabrication; testing pyrometry.

6896 The Theory of Cohesion. M. A. Jaswon. Pergamon Science Series. Metal Physics and Physical Metallurgy. v. II. 245 p. 1954. Interscience Publishers, New York. (QC183 J31t)

Mathematical and physical arguments involved in the theory of cohesion in aggregates, particularly in metals, which help bridge the gap between elementary and advanced treatments.

6897 Plastic Properties of Crystals and Metals. **Plastische Eigenschaften von Kristallen und metallischen Werkstoffen.** (German.) Albert Kochendörfer. 312 p. 1941. Verlag von Julius Springer, Berlin. (TA405 K81p)

Geometry of homogeneous deformations; effects of temperature and crystal structure; relationship of temperature to critical sheer stress; work hardening; effect of mosaic structure on slips; stability of deformed state. Experimental methods and results. Photographs, tables, graphs, diagrams.

See also:

6217 (refractories for the steel industry)
6495 (separation of rare earth metals)
6724 (review and forecast on non-ferrous metals)
6919 (W and Mo for vacuum tubes)

METALS—EXTRACTION AND REFINING

6898 The Preparation of Samarium Metal With Calcium. E. I. Instott. *American Chemical Society, Journal,* v. 77, Feb. 5, 1955, p. 812-813.

Samarium oxide (Sm_2O_3) is reduced by Ca metal and the Sm distilled in Ta containers under vacuum or A. Table. 4 ref.

6899* The Hot-Blast Cupola Furnace in the Steel Plant. **Der Heisswind-Kupolofen im Stahlwerk.** (German.) *Archiv für das Eisenhüttenwesen,* v. 26, no. 1, Jan. 1955, p. 1-8.

Effect of temperature and Si content on C in cupola iron; O blast; desulfurizing; heat losses; practical observations. Diagrams, tables, graphs. 28 ref.

6900* Testing Steel Plant Lime. R. Sewell. *British Steelmaker,* v. 21, Feb. 1955, p. 46-48.

Method for determining reactivity of lime from various sources. Tables, graphs. 5 ref.

6901* Study of the Variation of thePrincipal Chemical Constituents as a Function of the Sampling Area. **Étude de la variation des constituants chimiques principaux en fonction de l'emplacement de prélèvement.** (French.) Hentz. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 1, 1955, p. 193-200.

Variations in the C, P, and S contents of a steel ingot. Tables, diagrams.

6902* Formation at the Cathode of Aluminum and Sodium Subcompounds During Electrolysis of Cryolite Melts. **Obrazovanie na katode subsoedinenii aliuminiia i natriia pri elektrolize kriolitnykh rasplavov.** (Russian.) L. N. Antipin.

Doklady Akademii Nauk SSSR, v. 99, no. 6, Dec. 21, 1954, p. 1019-1022.

Cathode potential and current strength. Formulas derived from experimental data. Graphs. 5 ref.

6903* Electrolytic Oxidation of Carbon in Cryloite-Alumina Melts. **Elektroliticheskoe okislenie ugleroda v kriolit-glinozemnykh rasplavakh.** (Russian.) L. N. Antipin and A. N. Khudiakov. *Doklady Akademii Nauk SSSR*, v. 100, no. 1, Jan. 1, 1955, p. 93-96.

Relation of anode potential and gas composition changes to current density. Graphs. 7 ref.

6904 Electrolytic Preparation of Molybdenum From Fused Salts. IV. Preparation of Reduced Molybdenum Chlorides From Molybdenite Concentrate. Seymour Senderoff and Roger J. Labrie. *Electrochemical Society, Journal*, v. 102, Feb. 1955, p. 77-80.

Details of chlorinating and subsequent reduction in aqueous and non-aqueous solutions. Tables, diagram. 4 ref.

6905* Modern Methods of Casting Light-Metal Ingots. **Neuzeitliche Leichtmetallblockgiessverfahren.** (German.) Vincenz Fuss. *Giesserei*, v. 42, no. 2, Jan. 20, 1955, p. 25-35.

Development of ingot casting methods; equipment for intermittent and continuous casting. Diagrams, graphs, tables. 20 ref.

6906 An Attempt to Separate Titanium From Oxygen by Vacuum Sublimation, and Some Measurements of Evaporation Rates. A. B. Osborn. *Institute of Metals, Journal*, v. 83, Jan. 1955, p. 185-188.

Increased O content reduced evaporation rate. Condensed Ti contained much less O than the starting alloy but the process is not economically feasible for industrial purification. Graph, diagram, tables. 3 ref.

6907 Blast-Furnace Automation. A. W. Robinson. *Instruments and Automation*, v. 28, Feb. 1955, p. 266-269.

Control of charging program, temperature recording, blast control, and gas analysis. Diagrams, photographs. 2 ref.

6908 Vacuum Cast 150 Ton Forging Ingots in German Plant. *Iron Age*, v. 175, Feb. 17, 1955, p. 91-94.

Improved metallurgical quality and reduced manufacturing costs through combination of effects. Photographs, tables.

6909 Continuously Cast Wide Range of Alloy Steels. J. Selron. *Iron Age*, v. 175, Feb. 24, 1955, p. 88-90.

Continuously cast stainless, heat resisting, electrical, and tool steels show mechanical properties comparable to conventional ingot cast steels. Photographs, tables.

6910 Progress Review of Casting Bay and Soaking Pit Practice. L. H. W. Savage. *Iron & Steel*, v. 28, Feb. 1955, p. 43-48.

Study of heat losses from solidifying ingots and possibilities of retrieving some of this heat in soaking pits. Graphs. diagram. 21 ref. (To be continued.)

6911 Refractories in the Iron and Steel Industry. I. Alumino-Silicates. Helen Towers. *Iron & Steel*, v. 28, Feb. 1955, p. 55-59.

Progress in refractory technology since 1939. 42 ref.

6912 Effect of Temperature and Pouring Speed on Ingot Structure. *Iron and Steel Institute, Journal*, v. 179, Feb. 1955, p. 120-123 + 6 plates.

Studies on one ton ingots of Ni-Cr steel. Table, photographs, micrographs.

6913 Ingot Heat Conservation. Cooling of 15-Ton Ingots Between Teeming and Stripping. L. H. W. Savage and M. D. Ashton. *Iron and Steel Institute, Journal*, v. 179, Feb. 1955, p. 132-142.

Measurements of heat losses show that a 25% reduction in standing time between teeming and stripping is feasible and would result in saving of soaking pit fuel. Diagrams, photographs, tables, graphs. 3 ref.

6914 The Formation and Decomposition of Hercynite ($FeO.Al_2O_3$). B. G. Baldwin. *Iron and Steel Institute, Journal*, v. 179, Feb. 1955, p. 142-146 + 1 plate.

Effects of various oxide-additions on rate of formation of $FeO.Al_2O_3$ under blast furnace conditions. Refractogram, graphs. 5 ref.

6915 Sulphur Partition Between Gas, Slag, and Metal Phases Under Iron and Steelmaking Conditions. E. T. Turkdogan. *Iron and Steel Institute, Journal*, v. 179, Feb. 1955, p. 147-154.

Data indicate that S reaches equilibrium between slag and metal. Graphs, tables. 31 ref.

6916 Thermodynamics of Carbon Dissolved in Iron Alloys. III. Solubility of Carbon in Iron-Sulphur Melts. E. T. Turkdogan and R. A. Hancock. *Iron and Steel Institute, Journal*, v. 179, Feb. 1955, p. 155-159 + 1 plate.

Determination at 1200, 1350, and 1500 C show that S decreases solubility of C more than do Si and P. Tables, photographs, graphs. 9 ref.

6917 Continuous Multistage Separation by Zone-Melting. W. G. Pfann. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 297-303.

Description of *zone-void* modification of the zone-melting process which uses a vertical column through which voids are passed by moving heaters. Diagrams, tables, graphs. 10 ref.

6918 Super Purity Aluminium. Production, Properties and Applications. E. E. Spillett. *Metallurgia*, v. 51, no. 304, Feb. 1955, p. 59-64.

Double electrolytic process; corrosion resistance; mechanical and physical properties; applications. Diagram, tables, photographs, graph. 3 ref.

6919* Tungsten and Molybdenum in Vacuum Technique. **Wolfram und Molybdän in der Vakuumtechnik.** (German.) R. Palme. *Planseeberichte für Pulvermetallurgie*, v. 1, no. 2, Feb. 1953, p. 61-71.

Vacuum melting, properties, and uses in electric and electronics industry. Photographs, tables, graph, diagrams. 13 ref.

6920* On the Production of Pure Silicon. (English.) Kenji Ono and Tomoo Matsushima. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 6, no. 5, Oct. 1954, p. 477-496.

Production of pure Si by the reduction of $SiCl_4$ with Zn. Tables, graphs, diagrams. 10 ref.

6921* Simultaneous Desulfurization and Deoxidation of Steel Melts. **Die gleichzeitige Entschwefelung und Desoxydation von Stahlschmelzen.** (German.) Wilhelm Anton Fischer and Helmut Engelbrecht. *Stahl und Eisen*, v. 75, no. 2, Jan. 27, 1955, p. 70-75.

Survey of literature and test data on effects of C and Si content of the melt on S removal. Graphs, table. 8 ref.

6922 Burdening the Blast Furnace. I. Ore. II. Coke. III. Flux. IV. Furnace Operation. M. W. Lightner. *Steel*, v. 136, Feb. 7, 1955, p. 116 + 6 pages; Feb. 14, 1955, p. 92 + 4 pages; Feb. 21, 1955, p. 82, 84, 87; Feb. 28, 1955, p. 96, 98, 102.

Effects of ore, coke, and flux characteristics on blast furnace performance; effects of burden distribution and gas-permeability on furnace operation. Photograph, tables, graphs.

6923* Zone Melting of Aluminum Antimonide. **Zonenschmelzen von Aluminiumantimonid.** (German.) Hans Achim Schell. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 58-61.

Method of purifying Al-Sb to improve its semiconducting properties. Graphs, diagram, photograph. 9 ref.

Books and Miscellaneous Publications

6924 Physical Chemistry and Metal Extraction. D. W. Hopkins. 232 p. 1954. J. Garnet Miller, London. (TN665 H77p)

Metals—Extraction and Refining

Theory and practical applications of reactions between metallic compounds, metals, and slags of interest to students, research workers, and those in control of extraction processes.

See also:

6529 (production of Cb and Ta)
7297 (refining of Ge)

METALS—FINISHING, POLISHING, AND CLEANING

6925 Suggested Guide to Laboratory Metal Cleaning. J. C. Harris, W. Stericker, and S. Spring. *ASTM Bulletin*, 1955, no. 204, Feb., p. 31-34.

Soils; cleaning agents; procedures. Tables. 3 ref.

6926 Adhesion and Surface Preparation in Protective Metal Spraying. III. Industrial Grit Blasting Machines. J. M. Cowan. *Electroplating and Metal Finishing*, v. 8, Feb. 1955, p. 67-72.

Comparison of compressed air and centrifugal equipment. Photographs, diagram. 4 ref.

6927* Polishing of Metal by the Barrelling Process. L. Mable. *Institute of Metal Finishing, Bulletin*, v. 4, Winter 1954-1955, p. 289-298.

Equipment and processes for deburring, cleaning, and polishing. Photograph.

6928 Electrolytic Salt Baths Descale Hot and Cold-Rolled Stainless Strip. T. J. Nolan and G. E. Rowan. *Iron Age*, v. 175, Mar. 3, 1955, p. 119-121.

Continuous annealing and pickling at Atlas Steels, Ltd. Photograph, flowsheet.

6929* Economical Pickling in Theory and Practice. **Sparsames Beizen in Theorie und Praxis.** (German.) A. Pollack. *Metalloberfläche*, Ausgabe A, v. 9, no. 2, Feb. 1955, p. 17-22.

Review of literature on methods and equipment. Photographs. 51 ref.

6930 Bumper Guards. Processing Know-How Results in Superior Finished Product. Max Weinberg and Al Lake. *Plating*, v. 42, Feb. 1955, p. 144-146, 159, 179.

Interdependence of drawing, polishing, and plating processes in obtaining a good finish. Photographs.

6931* Chemical or Mechanical Descaling of Steel Bars? **Chemisches oder mechanisches Entzundern von Stabstahl?** (German.) Otto Peltzer. *Stahl und Eisen*, v. 75, no. 3, Feb. 10, 1955, p. 129-140.

Cost comparisons of shot blasting vs. pickling. Photographs, diagrams. 20 ref.

6932* Chemical Process of Descaling Stainless and Heat-Resisting Steel Without the Use of Acids. **Säurefreies chemisches Verfahren zum Entzundern nichtrostender und hitzebeständiger. Stähle.** (German.) Berthold Wenderott. *Stahl und Eisen*, v. 75, no. 3, Feb. 10, 1955, p. 141-144.

Method consists of treating in a salt bath followed by annealing in reducing atmosphere. Effects of treatment on corrosion and heat resistance. Table, graph, micrographs. 4 ref.

6933 Correct Abrasive Selection in Blast Cleaning Metals. V. F. Stine. *Steel Processing*, v. 41, Feb. 1955, p. 100-103.

Characteristics of various abrasive materials. Equipment factors. Important uses. Tables, photographs.

6934* Pickling Thin Sheet Metals Under the Influence of Sonic Energy. **Das Beizen von Feinblechen unter Einwirken von Schallenergie.** (German.) W. Meiswinkel. *VDI Zeitschrift*, v. 97, no. 2, Jan. 11, 1955, p. 42-46.

Reduction of pickling time and of acid consumption by subjecting sheet metals to sonic frequencies. Diagrams, tables, photographs, graphs. 24 ref.

6935* Several Problems of the Process of Polishing Al and Al Alloys. **Über einige Probleme zum Glänzvorgang bei Aluminium und Aluminiumlegierungen.** (German.) F. Baumann. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 8, no. 1, Jan. 1955, p. 14-18.

Mechanism and controls of anodic and chemical polishing processes; effect of the ion concentration in the polishing bath; importance of the composition of the metal to the polishing operation. Graphs. 9 ref.

Books and Miscellaneous Publications

6936 Modern Grinding and Polishing Practices. **Neuzeitliche Schleif- und Polierpraxis.** (German.) Walter Burkart. 192 p. 1954. Eugen G. Leuze Verlag, Saulau/Württenberg, Germany. (TJ1280 B91n)

Suggestions, materials, equipment, and proven methods for grinding and polishing metals, glass, plastics, precious and semi-precious stones; application of photoelectric luster meter; methods for cleaning polished articles.

METALS—FOUNDRY PRACTICE

6937* Preparation of the Charge at Expérance-Longdoz. Schmidt Rotary Furnaces. **Apprêt de la charge à Espérance-Longdoz. Fours rotatifs Schmidt.** (French.) M. Gérard. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 1, 1955, p. 133-168.

Analysis of results on the agglomeration of blast-furnace dusts in a rotary furnace; description of installations. Diagrams, tables, graphs.

6938* Interest in the Use of a Low-Carbon Cast Iron Prepared in the Hot-Blast Cupola as an Open-Hearth Charge. **Intérêt de l'emploi au four Martin d'une fonte à bas carbone. élaborée au cubilot à vent chaud.** (French.) Boutigny and Barbazanges. *Centre de Documentation Sidérurgique Circulaire d'Informations Techniques*, v. 12, no. 1, 1955, p. 169-192.

Includes graphs, tables, diagrams, photographs.

6939* Preparation Standard for A-S20 U. **Standard d'élaboration de l'A-S20 U.** (French.) *Fonderie*, 1955, no. 108, Jan., p. 4337-4339.

Procedure for melting and casting hypereutectic Al-Si alloys containing Cu and possibly Sn. Micrographs.

6940 Reclaiming Core Sand. William D. Dunn. *Foundry*, v. 83, Mar. 1955, p. 90-95.

Factors to be analyzed before installing sand reclamation in non-ferrous foundries. Diagrams, photographs, tables.

6941 A Study of Investment Materials. H. O. McIntyre. *Foundry*, v. 83, Mar. 1955, p. 96-99.

Characteristics and applications of usual investment materials. Photographs, graphs.

6942 New Ingot Mold Foundry. Edwin Bremer. *Foundry*, v. 83, Mar. 1955, p. 100-105.

Equipment and operations in highly mechanized foundry. Photographs, diagram.

6943 The Use and Care of Crucibles. W. M. Halliday. *Foundry*, v. 83, Mar. 1955, p. 106-109.

Safty and economic considerations for handling, storing, and use of graphite crucibles. Photographs.

6944 Production of Large Steel Castings. J. B. Mohler. *Foundry*, v. 83, Mar. 1955, p. 113-115.

Practices used for molding and pouring castings larger than 150 tons each. Photcgraphs.

6945 "Pop-Off" Type Moulding Boxes for the Mechanized Production of Light Castings. A. J. Crook. *Foundry Trade Journal*, v. 98, Feb. 10, 1955, p. 141-148.

Description of the full mechanization of a foundry where previously loose-pattern molding methods had been used. Photographs, diagrams.

6946 Another Look at "Expansion"-Type Scabs. Douglas C. Williams. *Foundry Trade Journal*, v. 98, Feb. 17, 1955, p. 169-174.

Hypothesis for explaining formation of scabs in iron and steel castings. Photograph, tables. 8 ref.

6947* Evaluating Coke With Cupola Research. **Koksbewertung durch den Kupolofenversuch.** (German.) Hans Jungbluth. *Giesserei*, v. 42, no. 1, Jan. 6, 1955, p. 2-6.

The coke-evaluation index; relations between melting efficiency, coke charge, amount of air, and combustion conditions; reactivity of various cokes; mechanism of raising the temperature of the iron. Graphs, table. 22 ref.

6948* Orienting Experiments on Foundry Practice. **Giessereikundliche Lehrversuche.** (German.) Ludger Frede. *Giesserei*, v. 42, no. 2, Jan. 20, 1955, p. 41-42.

Experimental study of flow in molds. Diagrams, photographs. 3 ref.

6949* Dielectric Drying of Cores. **Dielektrisches Trocknen von Kernen.** (German.) Kaarlo Wirta. *Giesserei*, v. 42, no. 3, Feb. 3, 1955, p. 49-54.

Principle and design of H.F. core drying furnaces; laboratory investigations on cores with different binders, water contents, and pH values; process is not suitable for cores with oil binders. Diagrams, photographs, graphs, tables. 1 ref.

6950* Effect of Foundry Sand on the Finished Casting. **Über den Einfluss des Giessereisandes auf das fertige Gussstück,** (German.) Hans Derlon. *Giesserei*, v. 42, no. 3, Feb. 3, 1955, p. 55-57.

Effect of type, shape, and grain size of sand and gas-permeability of mold on the quality of the casting. Diagram, micrographs, graphs. 8 ref.

6951* Plant Experiences With the Graphite-Bar Melting Furnace. **Betriebserfahrungen mit dem Graphitstab-Schmelzofen.** (German.) H. Reinfeld. *Giesserei*, v. 42, no. 3, Feb. 3, 1955, p. 60.

Brief report on the efficiency of furance. Graphs. 1 ref.

6952* Casting Defects and Their Causes. **Gjutodsfel och deras orsaker. VI.** Mold Wall Analysis. **Formväggsanalys.** (Swedish.) *Gjuteriet*, v. 45, no. 1, Jan. 1955, p. 1-5.

Factors affecting properties of mold surfaces. Table. (To be continued.)

6953 Colloidal Graphite Mixtures Aid Nonferrous Casting Techniques. W. A. Mader. *Iron Age*, v. 175, Mar. 3, 1955, p. 124-126.

Benefits of graphite coatings on chills, cores, dies, and pins; use as lubricant on foundry machines. Photographs.

6954* Prevention of Contraction Porosity of Chill Cast Magnesium Alloys. **Bor'ba s usadochnoi poristost'iu kokil'nykh otlivok iz magnievykh splavov.** (Russian.) A. M. Osokin. *Liteinoe Proizvodstvo*, 1955, no. 1, Jan., p. 1-3.

Optimum conditions of casting and heat treatment for prevention of porosity. Tables, photographs. 2 ref.

6955* Production of High-Strength Cast Iron in a Forehearth Cupola Furnace. **Proizvodstvo vysokoprochnogo chuguna v kopil'nike vagranki.** (Russian.) I. P. Petrov. *Liteinoe Proizvodstvo*, 1955, no. 1, Jan., p. 3-5.

Introduction of metallic Mg and ferro-silicon directly in the forehearth; furnace construction. Table, micrographs, diagram.

6956* Mechanization of Foundry Processes. **Les manutentions mécanisées en fonderie.** (French.) J. Pascal. *Métallurgie et la construction mécanique*, v. 87, no. 1, Jan. 1955, p. 23, 25-27.

Means for transporting liquid metal. Economics of mechanization. 7 ref.

6957 Plaster Mold Casting. R. B. Anderson. *Product Engineering*, v. 26, Feb. 1955, p. 193-199.

Technique and applications of this somewhat limited process. Tables, photographs.

6958* The Effect of Extremely Low Be Contents in Mg Alloys. **Ein Beitrag über die Wirkung kleinster Berylliumgehalte in Magnesiumlegierungen.** (German.) Karl Ernst Mann. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 17-24.

Effect of Be on the casting behavior, mechanical and chemical properties, surface condition, and microstructure of Mg-Al alloys. Graphs, photographs, micrographs, tables. 8 ref.

Books and Miscellaneous Publications

6959 Shell Molding and Shell Mold Castings. T. C. Du Mond. 128 p. 1954. Reinhold Publishing Corp., New York. (TS233 D89s)

Description of process, advantages and limitations, costs, and factors influencing selection of the process for various castings.

See also:

7212 (aids in casting design)

METALS—HEAT TREATMENT

6960 Quenching Conditions. C. Wilson. *Aircraft Production*, v. 17, Feb. 1955, p. 72-79.

Investigation of temperature changes in large high-strength light-alloy specimens. Photographs, diagram, graphs, tables.

6961* Control in Heat Treatment. J. G. Solomon. *Australasian Engineer*, 1954, Dec., p. 54-61.

Control of raw materials, heat treating processes, and final inspection. Table, micrographs, graphs, photographs. 12 ref.

6962* Heat Treatment of Ferrous Metals. *British Steelmaker*, v. 21, Feb. 1955, p. 50-58.

Features of recent installations in several British factories. Photographs, table.

6963 Continuous Carbonitriding Setup Promotes Safety, Uniform Quality. R. J. Belz. *Iron Age*, v. 175, Feb. 17, 1955, p. 95-97.

Integration of atmosphere hardening furnace with an automatic quench, wash, and draw unit for steering gear components. Photographs.

6964 Restore Surface Carbon in Sub-Critical and Over-Critical Anneal. J. D. Armour. *Iron Age*, v. 175, Feb. 24, 1955, p. 83-85.

Continuous annealing of cold drawn rod and wire in coils. Photographs, micrographs, tables.

6965 Continuous Batch Type Annealing Furnace. Ralph H. Gelder and Walter E. Hand. *Iron and Steel Engineer*, v. 32, Feb. 1955, p. 107-111.

Equipment; specifications; operating procedures. Photographs, graphs.

6966* Case-Hardening of Ferritic Malleable Cast Iron by H.F. Heating. **Poverkhnostnaia zakalka ferritnogo kovkogo chuguna pri vysokochastotnom nagreve.** (Russian.) M. O. Rabin and K. Z. Shepeliakovskii. *Liteinoe Proizvodstvo*, 1954, no. 9, Dec., p. 10-12.

Equipment and technique. Micro-structure after various periods of heating. Applications. Micrographs, photographs,, drawings.

6967* Furnaces for Annealing Malleable Cast Iron. **O pechakh dlia otzhiga kovkogo chuguna.** (Russian.) N. V. Sadin. *Liteinoe Proizvodstvo*, 1954, no. 9, Dec., p. 12-14.

Results of various time and temperature cycles in several furnaces. Graphs, tables. 4 ref.

6968 How to Avoid Heat Treating Difficulties Through Correct Design of Press Tools. Federico Strasser. *Metal Treating*, v. 6, Jan.-Feb. 1955, p. 2-4, 6, 8, 10; disc., p. 11.

Interdependence of heat treating and design in tool making. Diagrams, photographs.

6969 Application of Nitriding to Hot Forging Dies. Alexander F. Sherys. *Metal Treating*, v. 6, Jan.-Feb. 1955, p. 14, 16-17.

Improvements in die life by surface hardening. Photographs.

6970 Heat Treating Titanium. Leo Schapiro. *Metal Treating*, v. 6, Jan.-Feb. 1955, p. 20-21.

Heat treating cycles for commercial Ti alloys. Photographs, graphs.

6971 Cooperation Between the Heat Treater and the Steel Manufacturer. C. B. Post. *Metal Treating*, v. 6, Jan.-Feb. 1955, p. 24-27.

Problems in heat treating various tool steels. Photographs, micrograph.

Metals—Heat Treatment

6972* Experiments on Relieving Internal Stresses Caused by Welding and Superposed Thermal Stresses. **Versuche über den Abbau von Schweisseigenspannungen durch überlagerte Wärmespannungen.** (German.) K. Wellinger, Fr. Eichhorn, and Fr. Löffler. *Schweissen und Schneiden,* v. 7, no. 1, Jan. 1955, p. 7-14.

Annealing practice; measuring stresses and temperatures in test plates. Tables, graphs, diagrams. 5 ref.

6973* Temperature Control of Electric Heat-Treating Furnaces. **Temperaturregulierung von Elektroöfen zur Wärmebehandlung.** (German.) E. T. H. J. Horowitz. *Sprechsaal,* v. 88, no. 3, Feb. 5, 1955, p. 45-47.

Design and operation of various types of controls. Circuit diagrams, photograph. (To be continued.)

6974 Experiences With Commercial Gas Carburizing Equipment. H. C. Thomas. *Steel Processing,* v. 41, Feb. 1955, p. 115-121.

Equipment. Operating procedures and results. Photographs, diagram, micrograph, graphs.

6975* Surface Hardening of Large-Size Crankshaft Journals, Using H.F. Current of a Low Specific Power for Heating. **Poverkhnostnaia zakalka sheek kolenchatykh valov bol'shogo razmera s nagrevom T.V.Ch. pri maloi udel'noi moshchnosti.** (Russian.) G. M. Tel'nov and S. N. Sizov. *Vestnik Mashinostroeniia,* v. 34, no. 12, Dec. 1954, p. 66-68.

Comprehensive description of the method; factors involved; optimum conditions for operation. Diagram, table.

See also:

6834 (temperature control in heat treating furnaces)
7192 (flame hardenability of gray cast iron)

METALS—MECHANICAL AND PHYSICAL PROPERTIES

6976 Graphical Representation of the Spherical Progagation of Explosive Pulses in Elastic Media. Werner Goldsmith and William A. Allen. *Acoustical Society of America, Journal,* v. 27, Jan. 1955, p. 47-55.

Data from calculations for displacements, velocities, and stresses generated in a metal by an explosion. Graphs, tables. 6 ref.

6977 The Internal Friction of Dilute Alloys of Lead. (English.) J. Weertman and E. I. Salkovitz. *Acta Metallurgica,* v. 3, no. 1, Jan. 1955, p. 1-9.

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Explanation of discontinuities in stress-strain relationships of Ti containing 0.1 wt.% O and N. Graphs, micrographs. 26 ref.

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Explanation of deformation figures observed on cleavage faces of mica and NaCl crystals. Drawings, interferograms, refractograms. 5 ref.

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Comparison of various theoretical expressions and experimental data. Graphs. 17 ref.

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Effects of C, N, and O on damping peaks in ductile V. Graphs. 5 ref.

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Effect of static tensile and compression stresses on change of residual stress in normally annealed and refined structural steels. Tables, graphs, diagram. 18 ref.

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Measurements for range of 420 to 1002 F. Diagrams, tables, graph. 7 ref.

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6997* Application of Microphotoelastometry to the Study of Plastic Deformation. **Application de la microphotoélasticimétrie à l'étude de la déformation plastique.** (French.) Marcel Bonvalet. *Comptes rendus*, v. 240, no. 2, Jan. 10, 1955, p. 157-158.

Tensile tests on metallic specimens coated by ethoxy resin, utilizing the local birefringence of the varnish.

6998* Effect of High-Temperature Oxidation on the Chemical Composition of the Surface of a Ni-Cr-Ti-Al Alloy. **Influence de l'oxydation à chaud sur la composition chimique superficielle d'un alliage au nickel-chrome-titane-aluminium.** (French.) Frima Malamand and Georges Vidal. *Comptes rendus*, v. 240, no. 2, Jan. 10, 1955, p. 186-188.

Spectrographic technique to determine surface impoverishment by selective oxidation by Ti and Al. Explains the stress-rupture properties. Graphs. 4 ref.

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Electrical properties of nitrided Cr and Cr-Ti films. Diagram, graphs. 6 ref.

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Melting points, densities, expansion coefficients, electrical resistance, and magnetic susceptibility of metal of various degrees of purity. Graphs, tables.

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Factors to be considered in testing various metals in several conditions. Tables, graphs, diagrams. 6 ref.

7059* Fatigue of Metals—Our Knowledge and the Deficiencies in Our Knowledge. P. L. Teed. *Shell Aviation News*, 1954, no. 198, Dec., p. 16-21.

Influence of repeated stresses under various conditions; understressing; overstressing; cummulative rule. Graphs. 70 ref. (To be continued.)

7060* Phenomenon of Hydrogen Embrittlement During Arc Welding. **Väteförsprödningsfenomen vid ljusbågssvetsning.** (Swedish.) Tore Norén and Stig-Erik Erikson. *Svetsaren*, v. 19, nos. 2-3, 1954, p. 3-19, 22.

Review of experimental and theoretical data. Graphs, micrographs, photographs. 59 ref.

7061* Derivation of Equation for Equivalent Stresses by the Deviation Hypothesis. **Härledning av ekvation för jämförelsespänningen enligt deviationshypotesen.** (Swedish.) Carl T. Ingwall. *Svetsaren*, v. 19, nos. 2-3, 1954, p. 20-22.

Conditions for the start of yield in welded structures as a function of conditions in the tensile test. Graph.

7062* Improvement of the Fatigue and Corrosion Behavior of Piston-Engine Valve Springs. **Amélioration de la tenue a la fatigue et a la corrosion des ressorts de soupapes de moteurs a pistons.** (French.) M. R. Chevalier. *Technique et science aéronautiques*, 1954, no. 5, p. 348-353.

Results of tests on the influence of surface state on fatigue behavior, and on improving protection against corrosion. Micrographs, table, photograph.

7063* Theory and Application of Photoelasticity in the Elastoplastic Field. **Theorie und Anwendung der Spannungsoptik im elastoplastischen Gebiet.** (German.) R. Hiltscher. *VDI Zeitschrift*, v. 97, no. 2, Jan. 11, 1955, p. 49-58.

Development of photoelastic method; expansion of flow range and its effect on stress distribution in elastic ranges for two-dimensional states of stress and deformation; limitation of three-dimensional problems to flow-range determination. Graphs, table, diagrams, stress patterns. 13 ref.

7064* Dependence of the Strength of Threaded Joints on the Hardness of the Material in the Bolts and Pins. **Zavisimost' prochnosti rez'bovykh soedinenii ot tverdosti materiala boltov i shpilek.** (Russian.) A. I. Iakushev. *Vestnik Mashinostroeniia*, v. 34, no. 12, Dec. 1954, p. 3-6.

Chromium-nickel steel is recommended for static loading, with a hardness of 36Rc and up and for dynamic loading, with a hardness not exceeding 32-36 Rc. Tables, diagrams, graphs.

7065* Effect of Heat Treatment on Fatigue Strength of Steel During Atmospheric Corrosion. **Vliianie termoobrabotki na ustalostnuiu prochnost' stali pri atmosfernoi korrozii.** (Russian.) A. V. Riabchenkov and E. L. Kazimirovskaia. *Vestnik Mashinostroeniia*, v. 35, no. 1, Jan. 1955, p. 69-72.

Case-hardening; normalizing; micro-structures. Graphs, table, micrographs. 6 ref.

7066 Mechanical Properties of Welded 356 Aluminum Castings. Walter S. Tenner. *Welding Journal*, v. 34, Feb. 1955, p. 128-136.

Postweld heat treatment permits welding of this alloy. Photographs, tables, micrographs, diagrams.

7067 Sigma Phase in Austenitic Stainless Steel Weldments. O. H. Henry, M. A. Cordovi, and G. J. Fischer. *Welding Journal*, v. 34, Feb. 1955, p. 75S-81S.

Occurrence of sigma phase and its effects on tensile-impact properties. Tables, photographs, diagram, graphs.

7068 Fatigue Strength of Butt Welds in Structural Steels. L. A. Harris, G. E. Nordmark, and N. M. Newmark. *Welding Journal*, v. 34, Feb. 1955, p. 83S-96S.

Low H electrodes produce joints with best fatigue properties. Tables, diagrams, photographs, graphs. 7 ref.

7069 Filler-Metal Strengths in Brazed Copper Joints. W. H. Munse and D. C. Crawford. *Welding Journal*, v. 34, Feb. 1955, p. 105S-111S; disc., p. 111S.

Test data for six filler metals at various temperatures. Diagrams, tables, photographs, graph, micrographs. 13 ref.

7070 Brittle Fracture in Steel. C. P. Oldridge. *Welding and Metal Fabrication*, v. 23, Feb. 1955, p. 55-60.

Salient points of this vital problem. Photographs, graphs, diagram. (To be continued.)

7071 Fatigue Life of Stranded Hook-Up Wire. Donald C. Alexander. *Wire and Wire Products*, v. 30, Feb. 1955, p. 181-185, 221.

Vibration testing to simulate service conditions; variables which can be controlled. Photographs, tables.

7072* Some Applications of the Cylindrical Shell Theory. **Einige Anwendungen der Theorie der Zylinderschale.** (German.) Walter Wuest. *Zeitschrift für angewandte Mathematik und Mechanik*, v. 34, no. 12, Dec. 1954, p. 444-454.

Extension of the theory to open divisions of shells for cases of uniform stress distribution along one direction, and applied to cross-curved leaf and bimetallic cylinder springs. Diagrams, graphs, table. 9 ref.

7073* A New Process for Evaluating Plane Photoelasticity. **Ein neues Auswerteverfahren der ebenen Spannungsoptik.** (German.) L. Föppl. *Zeitschrift für angewandte Mathematik und Mechanik*, v. 34, no. 12, Dec. 1954, p. 454-459.

The orthogonal lines of principle stress are used as coordinate lines to describe the plane state of stress. Graphs. 2 ref.

7074* Comparison of Internal Stresses in Ferromagnetic Metals Determined by X-Ray and Magnetism. **Vergleich röntgenographisch und magnetisch ermittelter Eigenspannungen in ferromagnetischen Metallen.** (German.) Ludwig Reimer. *Zeitschrift für angewandte Physik*, v. 6, no. 11, Nov. 1954, p. 489-494.

Extension of the method of reversible magnetization energy to determine internal stresses in Fe reveals good agreement with the internal stresses determined from the line displacements in X-ray recordings. Graphs. 10 ref.

7075* A Relationship Between Hysteresis Coefficient and Permeability. **Eine Beziehung zwischen Hysteresebeiwert und Permeabilität. II.** Additional Results of Measurements. **Weitere Messergebnisse.** (German.) M. Kornetzki. *Zeitschrift für angewandte Physik*, v. 6, no. 12, Dec. 1954, p. 547-550.

Measurements were made on steels, Al and Ni alloys, and ferrites. Table, graphs. 11 ref.

7076* Internal Stresses After Plastic Tensile Deformation. **Über Eigenspannungen nach plastischer Zugverformung.** (German.) Viktor Hauk. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 33-38.

X-ray measurements on surface of slightly stretched flat steel and Al-alloy bars. Two types of internal stress are ascribed to elastic anisotropy and heterogeneity in a heterogeneous structure. Tables, micrographs, graphs. 30 ref.

7077* X-Ray Investigation of the Effect of Carbon Content on Internal Bending Stresses in Steel and Iron. **Röntgenographische Untersuchungen über den Einfluss des Kohlenstoffgehaltes auf Biege-Eigenspannungen in Stahl und Eisen.** (German.) Ludwig Reimer. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 39-42.

Slight plastic bending of pure Fe and steel bars with 0.35 and 0.6% C reveals an increase of internal stresses with increasing C content. Table, diagram, micrographs, graphs. 20 ref.

7078* The Specific Heat of Nickel Between 180 and 1160 C. **Die spezifische Wärme von Nickel zwischen 180 und 1160°.** (German.) Friedrich Krauss and Heinz Warncke. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 61-69.

Two methods of determining temperature dependence. Diagrams, graphs, tables. 25 ref.

7079* Self-Absorption of Beta-Activated Thallium in the Superconducting State. **Die Selbstabsorption von beta aktiviertem Thallium im supraleitenden Zustand.** (German.) Oswald Riedel and Fritz Schmeissner. *Zeitschrift für Physik*, v. 140, no. 1, 1955, p. 92-96.

It is experimentally shown that β radiation of a sheet of Tl which contains the active Tl^{204} isotope does not change when the metal becomes superconducting. Diagram. 9 ref.

7080* Polarographic Characteristics and the Normal Potential of a Metal. **Poliarograficheskie kharakteristiki i normal'nyi potentsial metalla. I-II.** (Russian.) Ia. I. Tur'ian and E. I. Grinberg. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2152-2155.

Experimental determination in ethyl alcohol solutions. Tables. 11 ref.

7081* Electrical Properties of Bismuth Alloys. **Elektricheskie svoistva splavov vismuta. I.** Solubility of Impurities and Nature of Their Effect on Electric Properties of Bismuth. **Rastvorimost' primesei i kharakter ikh vozdeistviia na elektricheskie svoistva vismuta. II.** Relation of Electrical Properties of Bismuth Alloys to the Impurity Concentrations. **Zavisimost' elektricheskikh svoistv splavov vismuta ot kontsentratsii primesei.** (Russian.) G. A. Ivanov and A. R. Regel'. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 39-65.

Experimental data on numerous binary and ternary alloys. Tables, graphs. 47 ref.

7082* Investigation of the Strength of Solids. **Issledovanie prochnosti tverdykh tel. II.** Relation of Rupture Life to Stress. **Zavisimost' dolgovechnosti ot napriazheniia.** (Russian.) S. N. Zhurkov and E. E. Tomashevskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 66-73.

Testing techniques. Effect of strain rate and stress on metals and plastics. Oscillograms, circuit diagram, diagrams, graph, table. 16 ref.

7083* Semiconducting Properties of Certain High-Resistance Metallic Alloys. **O poluprovdnikovykh svoistvakh nekotorykh vysokoomnykh metallicheskikh splavov.** (Russian.) A. I. Drabkin. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 81-84.

Properties of Constantan and Manganin before and after heat treatment. Tables.

7084* Relation of Coercive Force to Thickness of Sheets of Iron-Silicon Alloys. **O zavisimosti koertsitivnoi sily ot tolshchiny listov zhelezo-kremnistogo splava.** (Russian.) Iu. P. Burdakova and V. V. Druzhinin. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 108-111.

Effects of etching and rolling on magnetic properties. Graphs, table. 3 ref.

7085* Temperature and Grain Size Dependence of Strength of Tungsten Carbide-Cobalt Cermets. **Prochnost' metallokeramicheskogo tverdogo splava karbid vol'frama-kobal't v zavisimosti ot temperatury i razmera zeren.** (Russian.) G. S. Kreimer, O. S. Safonova, and A. I. Baranof. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 117-124.

Testing equipment and technique; micro-structural characteristics. Graphs, micrographs, tables, diagram. 4 ref.

7086* Isothermal Transformation of Ferrite in High-Alloy Austenitic-Ferritic Alloys. **Izotermicheskoe prevrashchenie ferrita v vysokolegirovannykh austenito-ferritnykh splavakh.** (Russian.) E. M. Pivnik. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 135-143.

Quenching and aging effects; formation of δ phase. Tables, diagrams, micrographs. 7 ref.

Books and Miscellaneous Publications

7087 Fatigue of Aluminum. R. L. Templin. 59 p. 1954. American Society for Testing Materials, Philadelphia. (TA480.A6 T24f)

Fatigue properties of various alloys and factors to be considered in design applications.

See also:

6606 (fretting corrosion and fracture)
6651 (electric analog of creep and recovery)
6855 (stresses in plates with cracks and notches)
6859 (elasticity theory)
6897 (plastic properties of metals)
6909 (properties of continuously cast alloy steel)
6958 (effects of Be on mechanical properties of Mg)
6970 (properties of heat treated Ti alloys)
7113 (impact stresses in rolling mills)
7177 (impact strength of Al killed steel)
7413 (fracture during welding)
7414 (properties of brazing alloys for heat resistant metal)
7425 (properties of welded Al-Mg-Mn alloys)

METALS—MECHANICAL WORKING

7088 Hot Formed Magnesium Skins Save Weight and Time. R. H. Owen. *Aero Digest*, v. 70, Feb. 1955, p. 52, 54, 56.

Techniques for hydraulic, drop hammer, punch press, and brake forming of aircraft control surfaces. Photographs.

7089 Machining Titanium. An Investigation Into the Machining of Ti-150A Alloy in the Forged State. I. Drilling and Turning Tests. Tool-Life. J. T. D. Holt and J. Purcell. *Aircraft Production*, v. 17, Feb. 1955, p. 60-64.

Drilling and cutting forces; effects of tool shape, cutting speeds, and lubricants on tool life. Photograph, tables, graphs, diagram.

7090 On the Drilling of Metals. I. Basic Mechanics of the Process. C. J. Oxford, Jr. *ASME, Transactions*, v. 77, Feb. 1955, p. 103-111; disc., p. 111-114.

Effects of drill design, material properties, and cutting conditions on the complex phenomena of twist drill cutting action. Diagrams, photographs, micrographs, graphs. 16 ref.

7091 The Shear Stress in Metal Cutting. M. C. Shaw and Iain Finnie. *ASME, Transactions*, v. 77, Feb. 1955, p. 115-123; disc., p. 123-125.

Explanation of discrepancies between torsion tests and cutting stress-strain data. Specimen size effect in cutting seems to be the most important factor. Diagrams, graphs, micrograph. 32 ref.

7092* High Power Spark Erosion Machine. L. R. Blake. *Engineer*, v. 199, Feb. 18, 1955, p. 222-226.

Circuits and operating characteristics. Diagrams, photographs, graphs. 3 ref.

7093 60-Cycle Induction Heating for Forging and Extrusion. John A. Logan. *Industrial Heating*, v. 22, Feb. 1955, p. 282 + 14 pages.

Specialization and developments in the heating of ferrous and non-ferrous metals. Photographs, graphs, diagram.

7094* Inconveniences Encountered in the Mechanical Working of Stainless Steels. **Inconvenienti riscontrati nella lavorazione meccanica degli acciai inossidabili.** (Italian.) *Industria Meccanica*, v. 6, no. 12, Dec. 1954, p. 662-665.

Detailed list of problems encountered in turning, shaping, drilling, extruding, milling, broaching, and boring of stainless steel.

7095 Hot Rolling. Z. Wusatowski. *Iron & Steel*, v. 28, Feb. 1955, p. 49-54.

Evaluation of factors influencing draft, spread, and elongation of steel during rolling. Diagrams, graphs, tables. 18 ref. (To be continued.)

7096 Hot Rolling With the Planetary Mill. H. M. Walter. *Iron & Steel*, v. 28, Feb. 1955, p. 68-71.

Fundamentals of the Sendzimir rolling mill and theory of its operation. Diagrams, photographs. (To be continued.)

Metals—Mechanical Working

7097 The Modern Continuous Weld Pipe Mill. L. V. Johnson. *Iron and Steel Engineer*, v. 32, Feb. 1955, p. 70-75; disc., p. 75.

Equipment and operating procedures. Photographs.

7098 Mechanical Features of Great Lakes 45x90-in. Universal Slabbing Mill. Phillip C. Vetter. *Iron and Steel Engineer*, v. 32, Feb. 1955, p. 112-116; disc., p. 116.

Equipment and operating characteristics. Photographs.

7099 Electrical Features of Great Lakes 45x90-in. Universal Slabbing Mill. Harold C. Hoeft. *Iron and Steel Engineer*, v. 32, Feb. 1955, p. 117-121; disc., p. 121-122.

Description of drive and its auxilliary equipment. Photographs, circuit diagrams, graphs.

7100 Problems of Forging. G. W. Richards. *Metal Industry*, v. 86, Jan. 28, 1955, p. 63-66.

Causes of high internal stresses in high-strength Al alloy forgings. Photographs, graphs.

7101 New Method for Machining Sintered Tungsten. Roberto Levi. *Precision Metal Molding*, v. 13, Mar. 1955, p. 58-60.

Technique consists of infiltrating the fully sintered porous ingot with a metal followed by machining and then removing the infiltrant by volatilization. Photographs, micrograph, table. 3 ref.

7102 Factors Affecting the Use of Hydraulic and Crank Presses for Cold-Working Operations. A. R. E. Singer. *Sheet Metal Industries*, v. 32, no. 334, Feb. 1955, p. 85-91, 144.

Economic, technical, and metallurgical considerations in selecting metal working machines. Graphs, table. 9 ref.

7103 The Rolling of Metals and Alloys. III. E. C. Larke. *Sheet Metal Industries*, v. 32, no. 334, Feb. 1955, p. 139-144.

Methods of thickness control. Photographs, tables, graph. 14 ref. (To be continued.)

7104* Computing the Average Length in Rolling Steel Shapes With Flanges and Webs. **Zur Berechnung der mittleren Längung beim Walzen von Formstahl mit Flanschen und Stegen.** (German.) Alfred Bahr. *Stahl und Eisen*, v. 75, no. 2, Jan. 27, 1955, p. 95-96.

Simple formula for computing the average elongation during rolling of any steel shape. Diagrams, table. 10 ref.

7105* Scaling and Surface Decarburization as an Undesirable Result of Heating for Forging. **Verzunderung und Randentkohlung als unerwünschte Folgeerscheinungen beim Wärmen von Schmiedegut.** (German.) Dietrich Horstmann. *Stahl und Eisen*, v. 75, no. 2, Jan. 27, 1955, p. 97.

Effects of temperature, O concentration, time. and type of steel. Graphs, nomogram. 3 ref.

7106* Experiences in the Rolling and Rerolling of Wide Strip in Multiple-Stand Cold Rolling Mills. **Erfahrungen beim Walzen und Nachwalzen von Breitband auf mehrgerüstigen Kaltwalzanlagen.** (German.) Vincenz Seul and Joseph Billigmann. *Stahl und Eisen*, v. 75, no. 3, Feb. 10, 1955, p. 144-162.

Characteristics of German equipment and operating practice. Tables, photographs, graphs, diagrams. 105 ref.

7107* Recent Investigations on the Drawing and Pushing-in of Steel Bars. **Neue Untersuchungen über das Ziehen und Einstossen von Stabstahl. I.** (German.) Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen*, v. 75, no. 3, Feb. 10, 1955, p. 162-169.

Review of present state of development in the bright drawing of steel bars. Micrographs, table, graphs. 15 ref.

7108* Present State and Future of Industrial Application of Electrical Methods of Machining Metals. **Sovremennoe sostoianie i perspektivy promyshlennogo ispol'zovaniia elektricheskikh sposobov obrabotki metallov.** (Russian.) V. Ia. Rassokhin and A. L. Livshits. *Stanki i Instrument*, v. 26, no. 1, Jan. 1955, p. 8-12.

Theory; technological characteristics of experimental machine tools; advantages and disadvantages. Diagrams, photographs.

7109 Electrolytic Grinding—Its Status and Future. George Comstock. *Steel Processing*, v. 41, Feb. 1955, p. 97-99.

Equipment and methods. Future prospects. Photographs, diagram, table.

7110 Problems in Press Tool Design. I. Blanking, Piercing and Allied Operations. J. A. Grainger. *Steel Processing*, v. 41, Feb. 1955, p. 104-112, 124.

Design factors for progressive dies. Diagrams, photographs.

7111* Rapid Method for Determining Tool Wear. **Skorostnoi metod opredeleniia iznosa instrumenta.** (Russian.) N. F. Kazakov. *Vestnik Akademii Nauk SSSR*, v. 25, no. 1, Jan. 1955, p. 43-45.

Use of radioactive isotopes for determining machine-tool condition. Graph.

7112* Calculation of Pressure of Metal on Rolls During Cold Rolling, Taking Into Consideration Strain and Cold Hardening. **Podschet davleniia metalla na valki pri kholodnoi prokatke s uchetom natiazheniia i naklepa.** (Russian.) A. I. Tselikov and A. V. Tret'iakov. *Vestnik Mashinostroeniia*, v. 34, no. 12, Dec. 1954, p. 10-12.

Mathematical treatment. Graphs, diagram, table. 4 ref.

7113* Problem of the Impact of Metal on the Rolling Mill Table Rollers. **K voprosu ob udare metalla o roliki rabochikh rol'gangov prokatnykh stanov.** (Russian.) F. F. Gorodkov. *Vestnik Mashinostroeniia*, v. 34, no. 12, Dec. 1954, p. 12-16.

Two particular cases are studied in detail on the basis of plastic mechanics. Diagrams, graph. 7 ref.

7114* A New Technological Method of Production of Cermet "Electrode-Tools" for Electric-Spark Machining of Metals. **Novaia tekhnologiia izgotovleniia metallokeramicheskikh elektrodov-instrumentov dlia elektroiskrovoi obrabotki metallov.** (Russian.) E. A. Volodin and L. A. Kovsharova. *Vestnik Mashinostroeniia*, v. 34, no. 12, Dec. 1954, p. 56-57.

Method, installation, conditions of operation, and material used. Photograph, diagrams.

7115* Force Relations During Blooming. **Silovye vzaimodeistviia na bloominge.** (Russian.) E. S. Rokotian. *Vestnik Mashinostroeniia*, v. 35, no. 1, Jan. 1955, p. 25-29.

Formulas for calculating rolling pressures and other factors. Graphs, tables. 3 ref.

7116* Rapid Heating of Blanks for Stamping. **Skorostnoi nagrev zagotovok pod shtampovku.** (Russian.) A. D. Assonov. *Vestnik Mashinostroeniia*, v. 35, no. 1, Jan. 1955, p. 76-77.

Temperature and time of heating; physical properties of the metal; gas heating and control problems; induction heating. Diagram.

7117 Flame-Straightening Bent Beams. Herman C. Phelps. *Welding Engineer*, v. 40, Mar. 1955, p. 24-25.

Procedures for localizing heated areas and application of force to restricted portions of the work. Photographs.

7118 Developments in the Flame-Cutting of Ship Plate. Richard R. Sillifant. *Welding and Metal Fabrication*, v. 23, Feb. 1955, p. 40-47.

Improvements in machine designs and cutting techniques. Photographs, diagrams, tables. (To be continued.)

7119* Thermal and Mechanical Stresses on Extrusion Dies. **Die thermische und mechanische Beanspruchung der Strangpresswerkzeuge.** (German.) Kurt Laue. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 1-6.

Survey of basic stress computations; principles of selection of suitable materials; extrusion characteristics of typical Mg, Al, Zn, and Cu alloys, and special steels. Graphs, photograph, tables. 1 ref.

See also:

6910 (soaking pit practice)
6930 (interdependence of drawing, plating, and polishing operations)
6969 (nitriding of forging dies)
7036 (microcracks in machined surfaces)
7420 (flame shaping and straightening)

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

7120* Phase and Structural Relations in the System Iron Tellurium. (English.) Fredrik Grønvold, Haakon Haraldsen, and John Vihovde. *Acta Chemica Scandinavica*, v. 8, no. 10, 1954, p. 1927-1942.

Alloys from 12 to 47% Fe are studied by X-ray diffraction. Tables, diagrams, graph. 25 ref.

7121 X-Ray Measurements on Silver Filings. (English.) F. R. L. Schoening and J. N. Van Niekerk. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 10-13.

Measurements on 99.999 and 99.6% pure Ag filings at −30 C. No evidence of stacking faults were observed. Table, graphs. 11 ref.

7122 Metallic Ternary Phases in the Mn-Ta-O System. (English.) Nils Schönberg. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 14-16.

One metallic phase (Mn_3Ta_2O) and one of mixed metallic and non-metallic properties, were found by X-ray analysis. Tables. 16 ref.

7123 The Segregation of Impurities to Grain Boundaries. (English.) W. R. Thomas and B. Chalmers. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 17-21.

Effects of grain orientations and annealing temperature on Po segregation in Pb-Bi alloys. Micrograph, graphs, table. 16 ref.

7124 Some Applications of Isoactivity Lines. (English.) Mats Hillert. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 34-36.

Connection between slope of tie-lines and change in activity along a phase boundary in ternary alloys. Diagrams. 6 ref.

7125 Solubility of Cementite in Liquid Iron. (English.) Mats Hillert. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 37-38.

Solubility curves for graphite and cementite in liquid Fe intersect at 10 C below the eutectic temperature. Explanation of solidification characteristics of cast iron. Graphs. 8 ref.

7126 Lattice and Grain Boundary Self-Diffusion in Cadmium. (English.) E. S. Wajda, G. A. Shirn, and H. B. Huntington. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 39-42.

Effects of temperature on diffusion in 99.5% pure crystals. Graphs, tables. 5 ref.

7127 Kinetics of Precipitation of Tin From Lead-Tin Solid Solutions. (English.) D. Turnbull and H. N. Treaftis. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 43-54.

Nucleation and growth of cells; construction of cells; effects of cold work on precipitation rate. Diagram, tables, graphs, micrographs. 15 ref.

7128 Theory of Cellular Precipitation. (English.) David Turnbull. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 55-63.

Mechanism of Sn precipitation from Pb-Sn alloys. Graphs. 17 ref.

7129 The Influence of Grain Boundaries on the Nucleation of Secondary Phases. (English.) P. J. Clemm and J. C. Fisher. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 70-73.

Calculation of critical energy for nucleation of ferrite from austenite at two, three, and four grain junctions. Diagrams, graph.3 ref.

7130 Transition Structure in Lead-Silver Alloys and a Dislocation Mechanism. (English.) R. D. Heidenreich. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 79-86.

Electron metallographic study of alloys with 0.009 to 0.23% Ag; dislocation model explains precipitation hardening and the hexagonal transition structure. Graphs, tables, micrographs, diagrams. 9 ref.

7131 Self-Diffusion in Thallium. (English.) G. A. Shirn. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 87-88.

Studies with Tl^{204} as a tracer at 150 to 275 C; possible diffusion mechanisms. Graph, tables. 2 ref.

7132 Sub-Grain Formation in Aluminum Deformed at −183° C. (English.) A. Kelly and W. T. Roberts. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 96-97.

X-ray microbeam study of 99.99% pure Al. Refractograms. 5 ref.

7133 The Diffusion of Hydrogen in Iron and Ferritic Steels. (English.) E. W. Johnson and M. L. Hill. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 99-101.

Tests on 99.9% Fe show that slowly diffusing H is a real component of the system and its amount depends on temperature and prior thermal history of the Fe. Table. 11 ref.

7134 Electron Microscope Study of Slip Bands in Radiation-Damaged Aluminum Crystals. (English.) E. M. Kelly. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 101-102.

Irradiation and straining at −196 C increased the amount of slip on a given plane; straining at room temperature showed no effects of irradiation. Micrographs. 2 ref.

7135 A Possible Explanation of the Stability of Guinier-Preston Zones. (English.) J. Nyström. *Acta Metallurgica*, v. 3, no. 1, Jan. 1955, p. 103.

Nucleation and growth of a new phase due to diffusion of a solute.

7136* The Eutectic Structure of Strongly Supercooled Aluminum-Copper and Aluminium-Iron Alloys. **Über das eutektische Gefüge von Aluminium-Kupfer- und Aluminium-Eisen-Legierungen bei starken Unterkühlungen.** (German.) E. Scheil and Y. Masuda. *Aluminium*, v. 31, no. 2, Feb. 1955, p. 51-55.

Special apparatus for severe supercooling. Eutectic composition ranges widen with degree of supercooling. Diagram, graphs, micrographs. 8 ref.

7137* Laws of Growth of Coupled Precipitates. **Wachstumsgesetz gekoppelter Ausscheidungen.** (German.) Otto Krisement. *Archiv für das Eisenhüttenwesen*, v. 26, no. 1, Jan. 1955, p. 55-57.

Growth of particles during precipitation of a new phase from a supersaturated solid solution. Zener's growth law. Double reactions; growth process of coupled precipitates. Graphs. 9 ref.

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Nucleus growth as a problem of diffusion. Diffusion fronts of individual precipitates; exponential growth law. Diagrams, graph. 10 ref.

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Relaxation and calorimetric measurements; dependence of relaxation on concentration. Graphs, tables. 9 ref.

7140* Investigation of the Critical Shear Stress for Single Crystals of Metallic Solid Solutions. II. (English.) J. O. Linde and Sture Edwardson. *Arkiv för Fysik*, v. 8, no. 6, 1954, p. 511-519.

Critical shear stress increases linearly with solute concentration for dilute solid solutions of Cu-base alloys, and the increase, per at. % of solute, varies as the square of corresponding change in lattice parameter. Graphs, tables. 4 ref.

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Structures were determined by the X-ray and microscopic techniques. Graphs, tables, micrographs. 13 ref.

7142* General Characteristics of the $\alpha \rightleftharpoons \sigma$ Transformation of Fe-Cr Alloys. **Caractères généraux de la transformation $\alpha \rightleftharpoons \sigma$ des alliages ferchrome.** (French.) Paul Bastien and Gilles Pomey. *Comptes rendus*, v. 239, no. 25, Dec. 20, 1954, p. 1797-1799.

High-purity alloys of equal composition which transform completely into the σ-phase. Micrographs.

7143* Spiral Substructure in an Aluminum β-γ-Brass. **Sur un type de sous-structure en spirales dans un laiton β-γ à**

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l'aluminium. (French.) Pierre A. Jacquet. *Comptes rendus*, v. 239, no. 25, Dec. 20, 1954, p. 1799-1801.

Electropolishing reveals figures very comparable to those found on growth faces of various mineral crystals. Micrographs. 4 ref.

7144* Interpretation of Spiral Substructures Observed in Aluminum β-γ-Brass. **Sur l'interprétation des sous-structures en spirales observées dans un laiton β-γ à l'aluminium.** (French.) Adrienne R. Weill and Pierre A. Jacquet. *Comptes rendus*, v. 239, no. 25, Dec. 20, 1954, p. 1801-1803.

Spirals observed result from a precipitation obeying a mechanism imposed by the assemblage of solute atoms and dislocations. 6 ref.

7145* Cause for the Stabilization of Austenite in the Martensitic Transformation. **Sur la cause de la stabilisation de l'austénite dans la transformation martensitique.** (French.) Jean Philibert. *Comptes rendus*, v. 240, no. 2, Jan. 10, 1955, p. 190-192.

Investigation of ferro-Ni containing traces of C and N; interpretation of phenomenon. Graphs. 2 ref.

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Isotherms for cast irons alloyed with Co, Si and Co, and W and Si. Graphs. 12 ref.

7147* Influence of Cr on the Self-Diffusion of Fe. **Vliianie khroma na samodiffuziiu zheleza.** (Russian.) P. L. Gruzin. *Doklady Akademii Nauk SSSR*, v. 100, no. 1, Jan. 1, 1955, p. 65-67.

Relation of temperature to coefficients of diffusion for different Cr-Fe ratios. Graphs, tables. 4 ref.

7148* The Shape of Pores Appearing During Mutual Diffusion of Metals. **O forme por, voznikaiushchikh pri vzaimnoi diffuzii metallov.** (Russian.) Ia. E. Geguzin. *Doklady Akademii Nauk SSSR*, v. 100, no. 2, Jan. 11, 1955, p. 255-257 + 1 plate.

Action in α-brass, Cu-Ni, and Cu-α-brass when heating in a vacuum at 950 C. Micrographs, photograph. 5 ref.

7149* Grain Size in Cast Iron. **La grosseur du grain dans la fonte.** (French.) Michel Ferry and Jean-Claude Margerie. *Fonderie*, 1955, no. 108, Jan., p. 4299-4319 + 1 plate.

Variations in micro-structure with size of casting and pouring temperature. Micrographs, graphs, tables, diagrams. 8 ref.

7150 An Apparatus for Electropolishing Specimens for Metallographic Examination. E. C. Sykes, V. J. Haddrell, H. R. Haines, and B. W. Mott. *Institute of Metals, Journal*, v. 83, Jan. 1955, p. 166-168.

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Explanation of surface nucleation effect in terms of piled-up dislocations. Diagram, photographs. 10 ref.

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Metallographic study of chill-cast specimens annealed at 460 C for 21 days. Graphs. 15 ref.

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Effects of Al and Sn on the $\alpha \leftrightarrows \beta$ transformation in Ti were studied by the hydrogen pressure method. Graphs. 10 ref.

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X-ray studies show max. solubility is 17.5 at.-% at 970 C, and 13 at.-% at room temperature. Graphs. 4 ref.

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Means of positive identification of inclusions. Tables, micrographs. 4 ref.

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Phase relations at steelmaking temperatures; two new oxides were identified. Graphs, tables, micrographs. 13 ref.

7157 Solid Solubility of Calcium in Magnesium. Edmund C. Burke. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 285-286.

Quantitative metallographic results agree with Vosskühler's data and suggest that Haughton's values are too high. Micrograph, graphs. 5 ref.

7158 Microstructures of Pyrophoric Alloys. R. D. Reiswig and David J. Mack. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 315-316.

Study of Ce base alloys show that best structure for lighter flints is a pyrophoric matrix with dispersed hard particles. Micrographs.

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Influence of micro-structure of TiC on properties of cermets. Explanation of "coring effect". Tables, micrographs. 11 ref.

7160 High Temperature Vacuum Etching on Pure Titanium. W. D. Bennett. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 322.

High temperature etching without contamination or increase in hardness. Micrographs. 2 ref.

7161 Vanadium-Zirconium Alloy System. J. T. Williams. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 345-350.

Equilibria were investigated by six techniques. Tables, diagrams, graphs, micrographs. 9 ref.

7162 Gallium-Antimony System. I. G. Greenfield and R. L. Smith. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 351-353.

Thermal, X-ray, and metallographic data. Diagram, graph, micrographs. 6 ref.

7163 Magnesium-Rich Corner of the Magnesium-Lithium-Aluminum System. J. A. Rowland, Jr., C. E. Armantrout, and D. F. Walsh. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 355-359.

Data from metallographic and X-ray studies. Micrographs, graphs. 11 ref.

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Metallographic and X-ray studies show no compounds up to 1.5% Mg.

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Isothermal softening and micrographic examination show effects of Mg on rate of nucleation and growth. Tables, micrographs, graphs. 26 ref.

7166 Some Aspects of the Crystallization and Recrystallization of Vapor-Deposited Vitreous Selenium. N. E. Brown and F. L. VerSnyder. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 379-381.

Microstructural changes as function of heat treatment; mode of hexagonal recrystallization. Micrographs. 3 ref.

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Effects of alloying elements on recrystallization texture of Cu alloys. Pole figures. 22 ref.

7168 Effect of Zinc Content on the Rolling Texture and Annealing Texture of Alpha Brass. Alfonso Merlini and Paul A. Beck. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 385-393.

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X-ray diffraction data. Table. 3 ref.

7172 Decomposition of Beta Titanium. Franz R. Brotzen, Edward L. Harman, Jr., and Alexander R. Troiano. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 413-419.

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7173 Sigma Phase in the Molybdenum-Ruthenium System. D. S. Bloom. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 420.

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Conditions leading to extremely large grains in isolated lots of commercial alloys. Photographs.

7175* Influence of Oxidation of Cast Iron on the Modification Effect. **Vliianie okislennosti chuguna na effekt modifitsirovaniia.** (Russian.) B. V. Stark and N. K. Nekrasov. *Liteinoe Proizvodstvo*, 1954, no. 9, Dec., p. 18-20.

Relation of micro-structure of modified and unmodified cast iron to preliminary oxidation and deoxidation. Effect of amount of Si under varying conditions. Table, graph, micrograph. 7 ref.

7176* Problem of the Use of Photoelements in the Metallographic Investigation of Cast Iron. **K voprosu o primenenii fotoelementov pri metallograficheskom issledovanii chuguna.** (Russian.) E. I. Egorov and Iu. S. Romashin. *Liteinoe Proizvodstvo*, 1954, no. 9, Dec., p. 22-23.

Equipment for more precise study of micro-structure. Micrographs, diagrams, graph, table.

7177* Influence of Aluminum on the Structure and Size of Austenitic Grain, and Impact Strength of Medium-Carbon Steel. **Vliianie aliuminiia na strukturu, velichinu austenitnogo zerna i udarnuiu viazkost' sredneuglerodistoi stali.** (Russian.) I. S. Gaev and V. V. Polovnikov. *Liteinoe Proizvodstvo*, 1955, no. 1, Jan., p. 18-21.

Experimental data for 0.37% carbon steel with various heat treatments. Micrographs, diagram, graphs, table. 7 ref.

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7179* Topochemical Reactions for Investigating Structures of Electrolytic Coatings. **Topochemische Umsetzungen mit galvanischen Überzügen zur Erkundung ihres Aufbaues.** (German.) Artur Kutzelnigg. *Metalloberfläche*, Ausgabe B. v. 7, no. 2, Feb. 1955, p. 17-20.

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Effect of initial particle size on rate of re-solution of carbides in medium-carbon steels. Graph, table, micrographs, photographs.

7181* Theory of Hyperfine Structure. Charles Schwartz. *Physical Review*, v. 97, ser. 2, Jan. 15, 1955, p. 380-395.

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Studies in steady temperature annealing by direct observation of the heat evolution and by measurement of specific heat. Graphs, tables. 29 ref .

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Structural defects lying on (111) and (123) planes. Similar lamellae may be introduced by plastic deformation. 3 ref.

7186* Structure and Properties of the Silicides. **Aufbau und Eigenschaften der Silizide.** (German.) H. Nowotny and E. Parthé. *Planseeberichte für Pulvermetallurgie*, v. 2, no. 2, Nov. 1954, p. 34-56.

Chemical and crystal structures and properties of mono- and polysilicides. Tables, diagrams, graph. 63 ref.

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Developments in lens design; specimen preparation; potential applications. Diagram, photographs, micrographs. 51 ref.

7188 Single Crystals Without Dislocations. H. K. Hardy. *Research*, v. 8, Feb. 1955, p. 57-61.

Mechanism of "whisker" formation on metals. Diagrams, table, photographs, micrograph. 8 ref.

7189* Production of Single Crystals of Iron-Aluminium Alloys by the Strain-Anneal Method. (English.) Mikio Yamamoto and Ryôfu Miyasawa. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 6, no. 4, Aug. 1954, p. 333-342.

Alloys of less then 6% Al studied for best decarburization, elongation working, recrystallization annealing, and macroetching qualities. Tables, diagram. 27 ref.

7190* On the Carbides in Manganese Steels. (English.) Hiroshi Yoshisaki. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 6, no. 5, Oct. 1954, p. 469-476.

Studies to determine whether these carbides are solid solutions or definite chemical compounds. Graphs, diagrams, table.

7191* Acceleration of the Austenite-Pearlite Transformation of a Case Hardening Steel With 2% Cr and 2% Ni by an Addition of V. **Beschleunigung der Austenit-Perlit-Umwandlung eines Einsatzstahles mit 2% Cr und 2% Ni durch Zusatz von Vanadin.** (German.) Sepp Ammareller and Paul Opel. *Stahl und Eisen*, v. 75, no. 2, Jan. 27, 1955, p. 65-69.

Time-temperature-transformation curves and case hardening tests show that V reduces the tendency toward cracking. Graphs, micrographs.

7192* Effect of Structure on Flame Hardenability of Gray Cast Iron. **Einfluss des Gefüges auf die Brennhärtbarkeit von Grauguss.** (German.) Hans Wilhelm Grönegress. *Stahl und Eisen*, v. 75, no. 2, Jan. 27, 1955, p. 89-95.

Spheroidal graphite gives best response to surface hardening. Service experience. Tables, micrographs, graphs, photographs. 8 ref.

7193* Hardenability Test With Reference to Rapid Heating and Cooling Processes. **Ett härdbarhetsprov med avseende på snabba värmnings- och kylningsförlopp.** (Swedish.) Tore Norén and Gerald Bini. *Svetsaren*, v. 19, nos. 2-3, 1954, p. 59-64.

Compliment to the Jominy test which is more reproducible for determining weldability. Diagram, graphs, micrographs. 5 ref.

7194* Age Hardening of Alloys. **Aushärtung von Legierungen.** (German.) H. Knapp. *Umschau in Wissenschaft und Technik*, v. 55, no. 2, Jan. 15, 1955, p. 38-40.

Atomic explanation of hardening principle and of its part in distinguishing between age- and quench-hardening. Graphs, X-ray photographs.

7195* Recording Molecular Objects With the Field-Electron Microscope. **Die Abbildung molekularer Objekte mit dem Feldelektronenmikroskop.** (German.) Peter Wolf. *Zeitschrift für angewandte Physik*, v. 6, no. 12, Dec. 1954, p. 529-535.

Study of organic substances in attempt to photograph individual mol. Diagrams, micrographs, tables. 10 ref.

7196* On the Hardening of Al-Ag Alloys in Thin Films. **Über die Aushärtung von Aluminium-Silber-Legierungen in dünnen Schichten.** (German.) Albert Winkelmann. *Zeitschrift für angewandte Physik*, v. 7, no. 1, Jan. 1955, p. 7-12.

Structural change during precipitation hardening of vapor-deposited Al-Ag alloys explains segregation of hexagonal gamma phase Ag_2Al. Graphs, diagrams. 10 ref.

7197* Columnar Grain Formation After Deformation and Recrystallization. **Stengelkornbildung nach Verformung und Rekristallisation.** (German.) Friedrich Erdmann-Jesnitzer and Hilde Ahr. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 26-32.

Explanation of large grains with preferred orientation in parts made by cold working from sheets of pure Al, Al-Mg alloy, and pure Zn. Micrographs, photographs, diagram. 19 ref.

7198* Correlation of the Outer Electron Positions in CuAu($L1_0$), PdCu($L2_0$), and Cu_3Au($L1_2$) Type Structures. **Über die Ortskorrelation der äusseren Elektronen bei den Strukturtypen CuAu($L1_0$), PdCu($L2_0$) und Cu_3Au($L1_2$).** (German.) Konrad Schubert. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 43-51.

Lattice-constant values for a large no. of alloys. Graphs, tables, diagrams. 32 ref.

7199* Silver-Palladium-Copper Alloys. **Die Silber-Palladium-Kupfer-Legierungen.** (German.) Ernst Raub and Georg Wörwag. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 52-57.

X-ray studies, thermal analyses, and microscopic studies; ternary constitution diagram; susceptibility to age hardening. Tables, graphs, micrographs. 6 ref.

7200* Method of Determining the Coefficient of Self-Diffusion of Iron in Alloyed Austenite. **K metodike opredeleniia koeffitsienta samodiffuzii zheleza v legirovannom austenite.** (Russian.) M. A. Krishtal. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 1, Jan. 1955, p. 144-148.

Based on decarbonization rate of graphitized cast iron; relation of temperature and Si content to self-diffusion of Fe. Tables. 13 ref.

See also:

6523 (dynamics of simple lattice)
6526 (spiral growth of crystals)
6638 (structures of electrodeposits)
6786 (quality of photographic negatives)
7005 (structures of Al-Si alloys)
7007 (polygonization in Al subjected to fatigue stresses)
7027 (ordering in Cu_3Au)
7033 (structures of modified cast iron)
7039 (structures of ternary Mn-Zn-C alloys)
7205 (structures of cermets)
7207 (diffusion in sintered Cu powders)

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7201* Dilatometric Study of Sintering Carbonyl Iron in the Isothermal Condition. **Étude dilatométrique du frittage du fer carbonyle en condition isotherme.** (French.) Georges Cizeron and Paul Lacombe. *Comptes rendus*, v. 240, no. 4, Jan. 24, 1955, p. 427-429.

Study at different sintering temperatures of the variation of density as a function of time using a Chevenard dilatometer. Graphs. 3 ref.

7202 Analysis of Continuity of One Phase in a Powder Mixture of Two Phases. F. Forscher. *Franklin Institute, Journal*, v. 259, Feb. 1955, p. 107-114.

Theoretical examination of conditions necessary to permit continuity. Diagrams, graphs. 6 ref.

7203 An Evaluation of Dissociated Ammonia and Hydrogen Atmospheres for Sintering Stainless Steel. Herbert S. Kalish and Edmund N. Mazza. *Journals of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Feb. 1955, p. 304-310.

Nitrogen from dissociated ammonia enters the metal and causes embrittlement, increased hardness, and slower sintering. Tables, micrographs, photograph. 17 ref.

7204* Studies on Grain Formation and Structure of Powders Produced by Dispersion of Molten Metals. **Studien über die Korngestalt und den Gefügeaufbau von Verdüsungspulvern.** (German.) E. Pelzel. *Metall*, v. 9, nos. 3-4, Feb. 1955, p. 81-88.

Effect of alloys on the condition of powders produced by spraying molten metal with compressed air through a nozzle. Micrographs, graphs, tables. 11 ref.

7205* Problems of Structure in Hard-Alloy Phases. **Strukturprobleme bei Hartstoffphasen.** (German.) H. Nowotny. *Planseeberichte für Pulvermetallurgie*, v. 1, no. 2, Feb. 1953, p. 43-60.

Relationship between lattice structure and hardness of different compounds; consideration of Hägg's theory on intercalation lattices. Diagrams, graphs. 33 ref.

7206* Bibliography. **Zeitschriftenumschau.** (German.) *Planseeberichte für Pulvermetallurgie*, v. 1, no. 2, Feb. 1953, p. 72-77.

Divided into various branches of powder metallurgy technology.

7207* Natures of Activation Energies in Self-Diffusion and in Sintering and of Sublimation Energy of Copper. (English.) Mitsuru Satô. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 6, no. 5, Oct. 1954, p. 458-461.

Studies of mechanism of sintering action of Cu powder. Table. 9 ref.

7208* Sintered Machine Parts. **Gesinterte Maschinenteile.** (German.) Gerhard Zapf. *VDI Zeitschrift*, v. 97, no. 4, Feb. 1, 1955, p. 89-96.

Equipment and methods; factors which influence the properties of sintered parts; effects of heat treating; molding practices; production costs. Photographs, diagrams, tables, graphs. 24 ref.

7209* Obtaining Nickel Powders by Electrolysis. **Poluchenie nikelevykh poroshkov elektrolizom.** (Russian.) B. V. Drozdov. *Zhurnal Prikladnoi Khimii*, v. 28, no. 1, Jan. 1955, p. 45-51.

Experimental methods and theoretical discussion. Tables. 13 ref.

See also:

6639 (plating of powder-metallurgy bronze parts)
6813 (specific surface of powders)
6842 (impregnation of bronze bearings)
7018 (properties of sintered WC-Co alloys)
7085 (strength of WC cermets)
7101 (machining of sintered tungsten)
7159 (micro-structure of sintered TiC)

MINING ENGINEERING

7210* Efficient Electric Drive of Mechanisms for the Drilling of Oil Wells. **O ratsional'nom elektroprivode mekhanizmov dlia bureniia neftianykh skvazhin.** (Russian.) T. Z. Portnoi and M. G. Iun'kov. *Energeticheskii Biulleten'*, 1955, no. 1, Jan., p. 11-24.

Circuits and operation equipment; comparisons of performances. Functional arrangements. Circuit diagrams, tables, graphs.

7211* Ignition of Explosive Mixtures by Flying Hot Metal Particles. **Zündung explosibler Gemische durch bewegliche heisse Metallteilchen.** (German.) Heinz Maskow and Wolfgang Bartknecht. *Glückauf*, v. 91, nos. 1-2, Jan. 1, 1955, p. 43-47.

Possible causes of mine explosions attributed to Al and Al-alloy particles. Danger may be eliminated by properly housed electric switches. Diagrams, photographs, tables, graphs. 6 ref.

See also:

6773 (action of sulfate-reducing bacteria on petroleum-bearing materials)
7381 (dust control in mines)

NONDESTRUCTIVE TESTING

7212 Nondestructive Testing Aids Casting Design. Robert H. Herrmann. *Foundry*, v. 83, Mar. 1955, p. 84-87.

Use of brittle lacquer and strain gages to aid in redesign of load-bearing castings. Photographs.

7213 Inspection Keeps Pace With Modern Manufacturing Methods. W. H. Vann. *Machinery*, v. 61, Mar. 1955, p. 162-169.

Development of automatic inspection equipment for use in manufacture of automobile engines. Photographs.

7214* The Use of Photoelectricity in the Metal-Processing Industry. **Die Anwendung der Photoelektrizität in der metallverarbeitenden Industrie.** (German.) H.-D. Schulz-Methke. *Metall*, v. 9, nos. 3-4, Feb. 1955, p. 97-99.

Describes properties of different photoelectric cells used for quality and production control. Graph, photographs. 4 ref.

7215* Industrial Control by Ultrasonics. Materials and Ultrasonics. Method of Control by Transmission. **Contrôle industriel par les ultra-sons. Les matériaux et les ultra-sons. Méthode de controle par transmission.** (French.) Jean Daurat. *Métallurgie et la construction mécanique*, v. 87, no. 1, Jan. 1955, p. 31, 33-34.

Theoretical basis; research into the hidden defects in the materials. Diagrams. (To be continued.)

7216* High Voltage Sources for Industrial Radiography —Past and Present, and Future Trends. E. E. Charlton. *Nondestructive Testing*, v. 13, Jan.-Feb. 1955, p. 13-22.

Development of equipment; accessory devices. Photographs, diagrams, graph. 36 ref.

7217* Theory and Application of Coil Magnetization. Glenn O. McClurg. *Nondestructive Testing*, v. 13, Jan.-Feb. 1955, p. 23-25.

Theoretical and experimental data on effective permeability of parts during magnetic particle inspection. Tables, graph. 8 ref.

7218* Nondestructive Testing in Shipbuilding and Ship Repair. A. K. Hutton. *Nondestructive Testing*, v. 13, Jan.-Feb. 1955, p. 27-31, 35.

Requirements, applications, and usefulness of nondestructive testing methods. Photographs, radiographs. 1 ref.

7219 Effect of Cold Worked Surfaces Upon Ultrasonic Echoes in Single Crystal Specimens of Lead. E. W. Kammer. *Review of Scientific Instruments*, v. 26, Jan. 1955, p. 14-15.

Cold worked surfaces distort the pulse and may lead to serious errors. Chart, diagram, table.

7220 Magnetic Particle, Penetrant and Related Inspection Methods as Production Tools for Process Control. Hamilton Migel. *Steel Processing*, v. 41, Feb. 1955, p. 86-91, 127.

Review of equipment, emthods, and uses. Photographs.

7221* Ultrasonic Shrink-Fit Testing of Ingot Receptacles for Extrusion Presses. **Ultraschall-Schrumpfsitzprüfung von Blockaufnehmern für Strangpressen.** (German.) Max Hetzler and Alfred Michalski. *Zeitschrift für Metallkunde*, v. 46, no. 1, Jan. 1955, p. 6-11.

Testing the fit of shrunk-on receptacle reinforcements; factors which influence the evaluation of results. Diagrams, graphs, photographs. 4 ref.

See also:

6268 (nondestructive chemical analysis)
6269 (nondestructive chemical analysis)
6580 (audigage thickness measurements)
6827 (nondestructive testing of coatings)
7424 (nondestructive testing of resistance welds)

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

7222 Radiation-Chemical Studies With Cyclotron Beams. Robert H. Schuler and Augustine O. Allen. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 507.

By deuterons and α-particles. Graph. 4 ref.

7223 Simplified Procedure for Computing the Growth of Radioactive Decay Products. H. W. Kirby and D. A. Kremer. *Analytical Chemistry*, v. 27, Feb. 1955, p. 298-299.

Presents example. Table. 7 ref.

7224* The Handling of Radioactive Materials. I. K. W. Bagnall and W. T. Spragg. *Atomics (British)*, v. 6, Mar. 1955, p. 71-78.

Manipulative techniques with particular attention to the needs of the small user with limited finances. Diagrams, photograph. 17 ref.

7225 Vapor Compression Evaporation Handles Radioactive Waste Disposal. Bernard Manowitz, Powell Richards, and Robert Horrigan. *Chemical Engineering*, v. 62, Mar. 1955, p. 194-196.

Provides a 100 fold vol. reduction. Photograph, flowsheet. 3 ref.

Nuclear Physics, Nucleonics, and Radiation

7226 World Looks to Peaceful Use of Atom. *Chemical and Engineering News*, v. 33, Mar. 7, 1955, p. 966, 968, 970.

Describes the world's reactions to the announced U. S. "atoms for peace" program. Photograph. 4 ref.

7227 Nuclear Reactors for Research. Manson Benedict. *Chemical Engineering Progress*, v. 51, Feb. 1955, p. 53F-66F.

Operation, application, types, and safety aspects. Tables, graphs, diagrams, photographs. 56 ref.

7228* Use of Radioactive Isotopes in the Investigation of Lignin. **Anwendung radioaktiver Isotope bei der- Erfors chung des Lignins. IV-V.** (German.) Karl Freudenberg, Werner Fuchs, and Martin Reichert. *Chemische Berichte*, v. 87, no. 12, 1954, p. 1824-1840.

Includes diagrams, structural formulas. 66 ref.

7229* Artificial Elements. **Künstliche Elemente. III.** (German. G. Herrmann. *Chemische Technik*, v. 7, no. 1, Jan. 1955, p. 6-10.

Problems of arranging the transuraniums in the periodic system; optical and magnetic measurements. Tables, graphs. 32 ref.

7230* Measuring the Energy of Very Slow Neutrons After an Inelastic Diffusion by Polycrystals and Monocrystals. **Mesure de l'énergie de neutrons très lents après une diffusion inélastique par des polycristaux et des monocristaux.** (French.) Bernard Jacrot. *Comptes rendus*, v. 240, no. 7, Feb. 14, 1955, p. 745-747.

Systematic study of the vibration spectrum of a crystalline network. Graphs. 6 ref.

7231* Quantum Yield of Radiation. **O kvantovom vykhode izlucheniia.** (Russian.) B. I. Stepanov. *Doklady Akademii Nauk SSSR*, v. 99, no. 6, Dec. 21, 1954, p. 971-974.

Analytical discussion. 2 ref.

7232 Reactor Maintenance Problems. C. B. Wagner. *Electrical Engineering*, v. 74, Mar. 1955, p. 221-225.

Protective measures for personnel. Photographs, graph.

7233 Branching Ratio in the Decay of Polonium-210. R. W. Hayward, D. D. Hoppes, and W. B. Mann. *Journal of Research, National Bureau of Standards*, v. 54, Jan. 1955, p. 47-50.

Found to be $1.22 \pm 0.06 \times 10^{-5}$. Tables, graphs, diagrams. 14 ref.

7234* "How Will Nuclear Power Affect Your Customers?" Lawrence R. Hafstad. *Mines Magazine*, v. 45, Jan. 1955, p. 25-28, 50.

Prospects of low-cost power.

7235* The Peaceful Use of Atomic Energy. **Mirnoe ispol'zovanie atomnoi energii.** (Russian.) V. A. Mikhailov and M. G. Mkrtychev. *Nauka i Zhizn'*, v. 22, no. 1, Jan. 1955, p. 7-10.

Atomic electric power station of the future and other possible applications. Diagrams.

7236 Reactor Control-Rod Theories. Raymond L. Murray and John W. Niestlie. *Nucleonics*, v. 13, Feb. 1955, p. 18-22.

Suggests a more logical theory for predicting reactivity effects. Diagrams, graphs. 5 ref.

7237 Measuring High Doses by Absorption Changes in Glass. James H. Schulman, Clifford C. Klick, and Herbert Rabin. *Nucleonics*, v. 13, Feb. 1955, p. 30-33.

Changes in optical density of glass is independent of dose rate. Graphs, table. 7 ref.

7238 Nomogram for Estimating Nuclear Reaction Energies. Alex E. S. Green. *Nucleonics*, v. 13, Feb. 1955, p. 34-37.

Estimation of Q-values of nuclear bombardment reactions. Graph, nomogram. 12 ref.

7239* Neutron Damage to the Structure of Vitreous Silica. Joseph S. Lukesh. *Physical Review*, v. 97, ser. 2, Jan. 15, 1955, p. 345-346.

Includes table, graph. 4 ref.

7240* Deuterium He^3 Reaction. W. E. Kunz. *Physical Review*, v. 97, ser. 2, Jan. 15, 1955, p. 456-462.

Includes diagrams, graphs. 19 ref.

7241* Sum Rules for Photodisintegration of the Deuteron. J. S. Levinger. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 970-974.

Total cross section was integrated numerically to 155 m.e.v. Graph, table. 25 ref.

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Studies of the nuclear radiation from the 30-hr. isomeric state. Graphs, tables. 5 ref.

7243* Masses of Light Nuclei. J. E. Drummond. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 1004-1007.

Values for the at. masses of 42 nuclei from n^1 to S^{34} are derived from data on 110 nuclear reactions and mass spectrographic doublets. Tables. 33 ref.

7244* Decay of Ta^{182} and Ta^{183}. J. J. Murray, F. Boehm, P. Marmier, and J. W. M. DuMond. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 1007-1016.

The β^- decays of Ta^{182} and Ta^{183} into excited states of W^{183} and W^{183} were studied using a curved crystal γ-ray diffraction spectrometer and a homogeneous field, ring focusing β-ray spectrometer. Graphs, tables, diagrams. 16 ref.

7245* Neutron Capture Cross Section of Ta^{182}. E. der Mateosian. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 1023-1024.

The neutron capture cross section of Ta^{182} was measured by comparing the β activity of Ta^{182} with that of Ta^{183} in a sample of Ta irradiated in the Brookhaven National Laboratory reactor. Graphs, diagram. 6 ref.

7246* Radiations From Cerium-141. James T. Jones, Jr. and E. N. Jensen. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 1031-1033.

The β spectrum of Ce^{141} was examined with an intermediate-image spectrometer adapted for coincidence measurements. Table, graphs. 13 ref.

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The disintegration of As^{71}, formed by the deuteron bombardment of separated Ge^{70}, was investigated with the help of magnetic spectrometers, scintillation spectrometers, and coincidence counting. Graphs, table. 6 ref.

7248* Amplitudes in Nucleon-Nucleon Scattering. G. Breit and M. H. Hull, Jr. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 1047-1050.

Mathematical analysis. 3 ref.

7249* Charge and Isotopic-Spin Conservation in Multiple Meson Production. Yehudah Yeivin. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 1084-1085.

General formulas are derived for the corrections to Fermi's cross sections. Tables. 5 ref.

7250 Double Diffracting X-Ray Spectrometer for Study of Irradiated Materials. W. V. Cummings, Jr., D. C. Kaulitz, and M. J. Sanderson. *Review of Scientific Instruments*, v. 26, Jan. 1955, p. 5-13.

Includes diagrams, graphs.

7251 Berkeley Proton Linear Accelerator. Luis W. Alvarez, Hugh Bradner, Jack V. Franck, Hayden Gordon, J. Donald Gow, Lauriston C. Marshall, Frank Oppenheimer, Wolfgang K. H. Panofsky, Chaim Richman, and John R. Woodyard. *Review of Scientific Instruments*, v. 26, Feb. 1955, p. 111-133.

Design and operation of accelerator now in use which increases the energy of protons from a four-m.e.v. Van de Graaff injector to a final energy of 31.5 m.e.v. Diagrams, graphs, photographs, tables. 29 ref.

7252 Standford High-Energy Linear Electron Accelerator (Mark III). M. Chodorow, E. L. Ginzton, W. W. Hansen, R. L. Kyhl, R. B. Neal, and W. K. H. Panofsky. *Review of Scientific Instruments*, v. 26, Feb. 1955, p. 134-204.

Equipment and operation. Diagrams, graphs, tables, photographs. 66 ref.

7253 The Stanford Mark II Linear Accelerator. R. F. Post and N. S. Shiren. *Review of Scientific Instruments*, v. 26, Feb. 1955, p. 205-209.

Development of the second linear accelerator constructed at Stanford University. Diagram, graphs, photographs, table. 6 ref.

7254 Proton Linear- Accelerator Injector for the Bevatron. Bruce Cork. *Review of Scientific Instruments*, v. 26, Feb. 1955, p. 210-219.

Design and operation of source of high-energy protons. Diagram, graphs, photographs, tables. 10 ref.

See also:

6254 (safety interlocks)

7255 Focusing in Linear Ion Accelerators. Lloyd Smith and Robert L. Gluckstern. *Review of Scientific Instruments*, v. 26, Feb. 1955, p. 220-228.

Results of investigation of three methods of obtaining transverse stability in linear accelerators for ions. Graphs, photograph. 17 ref.

7256* Sharp Focussing in Accelerators. **Starke Fokussierung bei Beschleunigern.** (German.) Walter Dällenbach. *Zeitschrift für Naturforschung*, v. 9a, no. 12, Dec. 1954, p. 1005-1012.

Review of literature; stability, periodicity, and max. elongation of betatron vibrations; effects of adjusting errors; and equations for phase vibrations. Diagram. 31 ref.

7257* The Chemical Separation of Isotopes as a Problem of Rectification. (English.) Cesare Marchetti. *Zeitschrift für Naturforschung*, v. 9a, no. 12, Dec. 1954, p. 1012-1016.

Operating conditions of a column for separation by chemical exchange reactions; cascading problems. Graphs, diagram. 2 ref.

7258* Temperature Rise in Thermal Reactors in the Absence of Cooling. **Über den Temperaturanstieg in thermischen Reaktoren bei Ausfall der Kühlung.** (German.) R. Schulten and H. Gaus. *Zeitschrift für Naturforschung*, v. 9a, no. 12, Dec. 1954, p. 1039-1043.

Formula for the max. temperature rise in the interior of nuclear reactors without cooling system or control mechanisms. Graphs. 4 ref.

7259* Concentration of Isotope Molecules in the Direct-Current Glow Discharge. **Anreicherung isotoper Moleküle in der Gleichstrom-Glimmentladung. IV.** The Primary Effect. Determination of the Concentration of Atoms in Hydrogen and Deuterium Discharges. **Der Primäreffekt. Bestimmung der Atomkonzentration in Wasserstoff- und Deuterium-Entladungen.** (German.) H. D. Beckey and P. Warneck. *Zeitschrift für Naturforschung*, v. 10a, no. 1, Jan. 1955, p. 62-67.

Includes diagram, graphs. 15 ref.

7260* A New Rhodium Isotope (106) With a Decay Period of 117 Minutes. **Ein neues Rhodiumisotop (106) mit einer Halbwertszeit von 117 Minuten.** (German.) G. B. Baró, W. Seelmann-Eggebert, and I. E. Zabala. *Zeitschrift für Naturforschung*, v. 10a, no. 1, Jan. 1955, p. 80.

Extraction of the isotope and its radioactive properties. 1 ref.

7261* Structure of the Phase Space and a Relationship Between Path-Rotation Impulse and Density Distribution of the Nucleons in the Atom Nucleus. **Struktur des Phasenraumes und ein Zusammenhang zwischen Bahndrehimpulsverteilung und Dichteverteilung der Nukleonen im Atomkern.** (German.) W. R. Theis. *Zeitschrift für Physik*, v. 140, no. 1, 1955, p. 1-15.

The electrons of the atom shell show agreement between an essentially constant density distribution of the nucleons with the empirical occupation numbers for all path rotation impulse eigen values. Diagrams, graphs. 11 ref.

7262* Theory of Nuclear Reactions With the Formation of Slow Particles. **Teoriia iadernykh reaktsii s obrazovaniem medlennykh chastits.** (Russian.) A. B. Migdal. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 28, no. 1, Jan. 1955, p. 3-9.

Energy and angular distribution of slow nucleons; evaluation of probability of formation of nucleons in the bound state. Table, equations. 3 ref.

Books and Miscellaneous Publications

7263 Radiation Biology. Ultraviolet and Related Radiations. Alexander Hollaender, editor. v. II. 593 p. 1955. McGraw-Hill, New York. (QH652 H71r)

Effects of ultra-violet radiation of interest in food preservation, general industrial uses, and as an analytical tool.

7264 High Energy Accelerators. M. Stanley Livingston. 157 p. 1954. Interscience Publishers, New York. (QC786 L76h)

Physical principles of operation, properties of particle orbits, and design principles of typical installations; future prospects.

7265* A Glossary of Terms in Nuclear Science and Technology. National Research Council. 206 p. 1953. American Society of Mechanical Engineers, New York. (QC772 N21g)

Proposed American standards in physics, reactor theory and engineering, chemistry, chemical engineering, biophysics, radiobiology, instrumentation, isotopes separation, and metallurgy.

See also:

6416 (radioisotopes in organic synthesis)
6564 (tritium for measuring moisture gradients)
6738 (γ-ray sterilization of canned meat)
6740 (irradiation sterilization)
6778 (nuclear geology)
7016 (radiation damage of Mo)
7043 (deuteron irradiation effects in Cu, Ag and Au)
7134 (radiation damage of Al)
7270 (guarding against atomic hazards)
7283 (industrial defense against radiation)
7348 (radiation effects on plastics)
7368 (polymerizing effects of γ-rays)

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

7266 How to Set Up a Gaging Policy and Procedure. D. G. Meckley, III. *American Machinist*, v. 99, Mar. 14, 1955, p. 133-144.

Ways to achieve true quality control. Diagrams, tables, photographs, charts.

7267 The Rank Correlation Method. John T. Litchfield, Jr. and Frank Wilcoxon. *Analytical Chemistry*, v. 27, Feb. 1955, p. 299-300.

Nomograph for coefficient. Example, table. 10 ref.

7268* Quality Control. I. J. H. Simcock. *Ceramics*, v. 6, Feb. 1955, p. 540-547.

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7269 No Letup in Technical Progress. *Chemical Engineering*, v. 62, Mar. 1955, p. 158-172.

Reviews technical, financial, and governmental aspects. Graphs.

7270 Outsmarting Those Atomic Hazards. *Chemical and Engineering News*, v. 33, Feb. 14, 1955, p. 652, 654.

Practical considerations in laboratory operations. Photograph.

7271 Upgrading the Human Element. *Chemical Week*, v. 76, Feb. 19, 1955, p. 62-64.

Advantages of maintaining communication are stressed.

7272* Introduction to the Presentation of Statistical Processes in Natural Science and Technology. **Einführung in die Darstellung von statistischen Vorgängen in Naturwissenschaft und Technik.** (German.) Erich Frommer. *FTZ; Fernmeldetechnische Zeitschrift*, v. 8, no. 1, Jan. 1955, p. 22-28.

The fundamental parameters and distributions are explained with application to radio techniques. Tables, graphs. 7 ref.

Operations Research and Management Engineering

7273 Geneva Laboratory of the Battelle Memorial Institute. Frank C. Croxton. *Nature,* v. 175, Jan. 22, 1955, p. 152-153.

A brief account of the formal opening, and description of the Geneva Laboratory and its role in future research operations. Photograph.

7274 Problems of Growth of Large Organizations. *Research,* v. 8, Feb. 1955, p. 42-47.

Problems which beset a growing enterprise and ways of preventing inefficiency.

7275* Automatic Digital Computers in Industrial Research. V. R. F. Clippinger, B. Dimsdale, and J. H. Levin. *Society for Industrial and Applied Mathematics, Journal,* v. 2, Sept. 1954, p. 184-200.

Problems for which computers have proved efficient. Diagram, tables. 5 ref.

Books and Miscellaneous Publications

7276 The Management Team. Edward C. Bursk, editor. 221 p. 1954. Harvard University Press, Cambridge, Mass. (HF5500 B94m)

Includes 11 papers on ways of delegating authority and maintaining control in an executive group.

7277 Labor Productivity in Soviet and American Industry. Walter Galenson. 273 p. 1955. Columbia University Press, New York. (HD57 G13L)

Data taken largely from Soviet technical journals are compared with data for corresponding American industries. Covers coal, iron ore, crude oil, natural gas, iron and steel, cotton textile, shoe, and beet sugar industries.

7278 Man in Structure & Function. Fritz Kahn. (Translated from the German by George Rosen.) v. I-II. 742 p. 1953. Alfred A. Knopf, New York. (QP38 K12m)

Description and behavior of human organs; nutrition and digestive processes.

7279* Handbook of Emergency Toxicology. Sidney Kaye. 303 p. 1954. Charles C. Thomas, Springfield, Ill. (RA1211 K18h)

Guide for diagnosis of poisoning; chemical and biological identification of poisons.

7280 Business Management Handbook. J. K. Lasser, editor. Rev. Ed. 809 p. 1954. McGraw-Hill, New York. (HF5351 L33b2)

Collection of successful methods used by American businessmen in various levels of management.

7281 Administrative Management. Philip R. Marvin. 2nd Ed. 132 p. 1954. Research Press, Dayton. (HD31 M36a2)

Course of action based upon experiences of successful executives; an analysis of executive performance as judged by effective action.

7282 Techniques That Produce Teamwork. Warren H. Schmidt and Paul C. Buchanan. 75 p. 1954. Arthur C. Croft Publications, New London, Conn. (BF637 Sch56t)

Goals of effective group effort and ways to promote joint responsibility and interest in a group.

7283 Businessmen's Conference on Industrial Defense in the Atomic Age, Proceedings. 68 p. 1954. U. S. Chamber of Commerce, Department of Manufacture, Washington, D. C. (UA926 B96p)

Includes "The Menace", Donald A. Quarles; "The H-Bomb and American Industry", Val Peterson; "Defense Mobilization in the Atomic Age", Arthur Flemming; "Federal Activities for Non-Military Defense", Willard S. Paul; "The BDSA Program for Industrial Defense", Cahrles F. Honeywell; and "Why a Plan for Emergency and Disaster?", John Redmond.

See also:

6254 (safety interlocks)

ORE AND MATERIALS BENEFICIATION

7284 Recent Developments in Flotation Practice at the Sullivan Concentrator. P. M. Elliott and J. P. Campbell. *Canadian Mining and Metallurgical Bulletin,* v. 48, no. 514, Feb. 1955, p. 55-58; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 58, 1955, p. 23-26.

Use of Dowfroth in place of standard water gas tar-creosote-cresylic acid mixture and a "de-zincing" treatment of Pb concentrates. Tables, graph, flowsheet.

7285 The Representation of Coal Cleaning Results. R. M. Horsley and P. F. Whelan. *Canadian Mining and Metallurgical Bulletin,* v. 48, no. 514, Feb. 1955, p. 74-83; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 58, 1955, p. 42-51.

Comparison and evaluation of several diagrams and curves used to summarize washing data. Diagrams, tables, graphs. 40 ref.

7286* Battelle Mud Study. V. For Chip Clearance Adequately High Fluid Velocity Required. Search for Mud Properties. Donald Gideon and Ralph Simon. *Drilling Contractor,* v. 11, Feb. 1955, p. 67-68, 70.

Penetration of rock bits. Effects of flow rate on chip clearance using several types of fluid. Graphs, photograph.

7287 Ore Dressing—Review and Forecast. Milling. Iron Ore Beneficiation. Extractive Metallurgy. Nathaniel Arbiter, Fred D. DeVaney, and A. W. Schlechten. *Engineering and Mining Journal,* v. 156, Feb. 1955, p. 127-138.

Includes photographs, diagram.

7288* The Processing of Uranium Ores of the Colorado Plateau by the Climax Uranium Company. Woodrow Knott. *Mines Magazine,* v. 45, Jan. 1955, p. 29-30.

Equipment and processes.

7289 Flotation of Molybdenite at the Morenci Concentrator. J. E. Papin. *Mining Engineering,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 202, Feb. 1955, p. 145-147.

Flotation agents; equipment; operating procedures. Tables, flowsheet.

7290* The Waelz Process. C. W. Jensen. *Mining Magazine,* v. 92, Feb. 1955, p. 73-79.

Process for recovery of Zn, Pb, Sn, Sb, Cd, Hg, As, Mo, and Tl by vaporizing the metal from low grade ores or residues. Table, graph.

7291* Dressing Tin-Columbite Concentrates. *Mining Magazine,* v. 92, Feb. 1955, p. 86-89.

Practices used in Nigeria. Flowsheet, photograph.

7292* Isotopic Analyses of Anomalous Lead Ores. R. M. Farquhar and G. L. Cumming. *Royal Society of Canada, Transactions,* v. 48, ser. 3, sect. 4, June 1954, p. 9-16.

Proportions of the various Pb isotopes in an ore depends on the geologic time of separation from the source rock. Tables, graph. 16 ref.

7293 Graph of Components in Gibbsite-Kaolinite-Type Bauxite. G. C. Branner. *U. S. Bureau of Mines, Information Circular* 7709, Jan. 1955, 9 p. (TN21 Un3i)

Graphic representation of relative amounts of alumina and silica in above type of bauxite with varying proportions of gibbsite and kaolinite. Graphs, tables.

7294 Beneficiation of Western Phosphate Ores. W. A. Stickney and R. R. Wells. *U. S. Bureau of Mines, Report of Investigations* 5098, Jan. 1955, 13 p. (TN21 Un3r)

Methods of concentrating low-grade ores. Tables. 4 ref.

7295 Cleaning Characteristics and Cleaning Tests of Montana Coal. M. R. Geer and H. F. Yancey. *U. S. Bureau of Mines, Report of Investigations* 5103, Jan. 1955, 47 p. (TN21 Un3r)

Includes tables, graphs, photograph. 6 ref.

7296 Preparation Characteristics of Coal From Wyoming County, W. Va. J. W. Miller, T. R. Jolley, and M. Sokaski. *U. S. Bureau of Mines, Report of Investigations* 5112, Feb. 1955, 26 p. (TN21 Un3r)

Practicability of upgrading marginal deposits to metallurgical standards. Diagrams, tables, map, graphs. 14 ref.

7297* Production and High-Purification of Germanium. **Gewinnung und Hochreinigung von Germanium.** (German.) Oskar Rösner. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 8, no. 1, Jan. 1955, p. 1-7; disc., p. 7.

Practical methods of concentrating Ge-bearing ore and of extracting as $GeCl_4$, reducing the chloride, and refining the metal. Graphs, diagrams, micrographs.

7298* Antimony-Ore Mining in Eastern Thuringia. **Der Antimonerzbergbau in Ostthüringen.** (German.) Manfred Bachmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 8, no. 1, Jan. 1955, p. 7-14.

Discusses the geological conditions, ore deposits, and mining, dressing, and smelting practices in the various regions. Maps, tables, diagrams. 5 ref.

See also:
6756 (coal grinding)
6766 (coal beneficiation)
6868 (agglomeration of coal and coke)

PHYSICS

7299* An X-Ray Diffraction Study to Determine the Effect of the Method of Preparation Upon the Crystal Structure of TiO_2. (English.) Seppo Wilska. *Acta Chemica Scandinavica*, v. 8, no. 10, 1954, p. 1796-1801.

Processing variables on both sulfate and chloride solutions of TiO_2 were evaluated. Table, graph, X-ray diffraction records. 8 ref.

7300 Technique for Continuous Intensity Standardization in Quantitative Analysis by Nuclear Magnetic Absorption. R. H. Elsken and T. M. Shaw. *Analytical Chemistry*, v. 27, Feb. 1955, p. 290-292.

Includes diagram, graph, photograph. 5 ref.

7301* Refraction Phenomena on Electron Waves and Their Quantum-Mechanical Explanation. **Beugungserscheinungen an Materiewellen und ihre quantenmechanische Deutung.** (German.) E. Plötze. *Archiv für technisches Messen*, 1955, no. 229, Feb., p. 33-36.

Experimental data on the refraction of electrons. Diagrams, graphs, X-ray diffraction patterns, tables. 8 ref.

7302* Photo-Electric Mass Determinations in Nuclear Emulsions. I. An Investigation of the Accuracy of Mass Determinations. II. A New Correction for Local Variations in the Emulsion With a Report on the Photo-Electric Identification of K-particles. (English.) Krister Kristiansson and Sten von Friesen. *Arkiv för Fysik*, v. 8, no. 4, 1954, p. 305-331.

Includes graphs, tables. 23 ref.

7303* The Reflection and Transmission of X-Rays in Quartz Near the Bragg Angle. (English.) Gösta Brogren. *Arkiv för Fysik*, v. 8, no. 4, 1954, p. 371-382.

Experimental determinations and theoretical calculations of the intensity curves of the reflected and transmitted radiation in the symmetric Laue case. Tables, graphs. 11 ref.

7304* Emission of Ultra-Violet Radiation in Gaseous Mixtures Subjected to the Action of α-Particles. **Émission de rayonnement ultraviolet dans les mélanges gazeux soumis à l'action des particules α.** (French.) Solange Lormeau-Loustau. *Comptes rendus*, v. 240, no. 7, Feb. 14, 1955, p. 768-770.

Study of action of α-particles on $N_2 + O_2$, $N_2 + H_2$, and $H_2 + O_2$ mixtures. Graph. 3 ref.

7305* Influence of Mechanical Pressure on the Dielectric Properties of a Ferroelectric Ceramic. **Vliianie mekhanicheskogo davleniia na dielektricheskie svoistva segnetokeramiki.** (Russian.) E. V. Siniakov and I. A. Izhak. *Doklady Akademii Nauk SSSR*, v. 100, no. 2, Jan. 11, 1955, p. 243-246.

Relation of polarization, dielectric penetrability, and Curie temperature to pressure. Graphs, table. 4 ref.

7306 Photoconductive Detectors for Infrared Systems. Roy Paulson. *Electrical Engineering*, v. 74, Mar. 1955, p. 214-218.

Properties of PbS detectors. Graphs, table, circuit diagram, photograph. 9 ref.

7307* The Quartz Clock as a Standard of Frequency and Time. **Die Quarzuhr als Frequenz- und Zeitnormal.** (German.) Adolf Scheibe. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 4, Feb. 1955, p. 153-158.

Includes diagrams, photographs, graphs, tables, circuit diagrams. 25 ref.

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Attempts to establish existence of ferro-electric Barkhausen effect associated with the domain structure. Noise patterns, graphs, table, micrograph, circuit diagram. 15 ref.

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Measurements of the a.c. and d.c. response of illuminated *F*-centered KBr single crystals. Graphs, tables. 42 ref.

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Includes photograph, charts, drawings. 7 ref.

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Astigmatism and distortion of asymetrical reflecting systems. Diagrams, graph.

7312* Some Experiments on the Phase-Contrast Microscope. **Über einige Experimente zur Phasenkontrast-Mikroskopie.** (German.) Kurt Räntsch. *Optica Acta*, v. 1, no. 3, Dec. 1954, p. 141-151.

An evaluation of two theories relating to the phase-contrast method of obtaining high contrast. Diagrams, photographs.

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Includes graphs. 9 ref.

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Mathematical analysis. Diagram, graph. 7 ref.

7315* Thermal Ionization of Impurities in Polar Crystals. II. Application to Interstitials in Cubic ZnS. H. D. Vasileff. *Physical Review*, v. 97, ser. 2, Feb. 15, 1955, p. 891-896.

General theory of thermal ionization of impurities in a polar crystal is applied to interstitials. Graph. 19 ref.

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Properties of single crystals from 77 to 1000 K. Diagrams, graphs, tables. 15 ref.

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Propetries of Tutton salts at room temperature. Diagram, graphs. 4 ref.

7318* Spectrally Pure Light Through "Interference Filters". **Spektralreines Licht durch "Interferenz-filter".** (German.) C. von Fragstein. *Umschau in Wissenschaft und Technik*, v. 55, no. 4, Feb. 15, 1955, p. 100-102.

Isolation of light in a narrow range of wave lengths by use of filters. Diagrams, graphs. 1 ref.

7319 Measured Effective Thermal Conductivity of Uranium Oxide Powder in Various Gases and Gas Mixtures. J. S. Boegli and R. G. Deissler. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E54L10, Mar. 1955, 20 p. (TL782 Un3rm)

Test data for range from 200 to 1500 F. Tables, diagram, graphs. 7 ref.

7320 Standard X-Ray Diffraction Powder Patterns. III. Data for 34 Inorganic Substances. Howard E. Swanson, Ruth K. Fuyat, and George M. Ugrinic. *U. S. National Bureau of Standards Circular* 539, June 1954, 73 p. (T21 Un3c)

Revisions for the ASTM card file for the identification of unknown crystalline materials. Tables. 186 ref.

7321* Dynamic Method of Investigating Nuclear Paramagnetism. **Dinamicheskii metod issledovaniia iadernogo paramagnetizma.** (Russian.) N. M. Pomerantsev. *Uspekhi Fizicheskikh Nauk*, v. 55, no. 1, Jan. 1955, p. 3-47.

Theories of magnetic resonance of atomic nuclei; continuous effect methods; measurement of magnetic moments. Diagrams, graphs, oscillograms. 80 ref.

7322* Electrets of Naphthalene and the Formation of Their Homocharges. **Über Elektrete aus Naphthalin und die Entstehung ihrer Homoladung.** (German.) Wolfgang Baldus. *Zeitschrift für angewandte Physik*, v. 6, no. 11, Nov. 1954, p. 481-489.

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7323* Definition of X-Ray Intensifying Screens. **Über die Zeichenschärfe von Röntgen-Verstärkerfolien.** (German.) Constantin Klett. *Zeitschrift für angewandte Physik*, v. 6, no. 12, Dec. 1954, p. 556-560.

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7324* Photoelectric Properties of Vapor-Deposited CdS Flims. **Über die lichtelektrischen Eigenschaften von aufgedampften Kadmiumsulfidschichten.** (German.) Werner Veith. *Zeitschrift für angewandte Physik*, v. 7, no. 1, Jan. 1955, p. 1-7.

Preparation; effect of illuminating intensity and temperature on photosensitivity, photoelectric inertia, electrical properties, phosphorescence, and position of Fermi level. Graphs, tables. 16 ref.

7325* Spectrometry of Electron Interferences. **Spektrometrie von Elektronen-Interferenzen. II.** Evaluation of the Interference Spectrograms and Comparison With Theory. **Auswertung der Interferenz-Spektrogramme und Vergleich mit der Theorie.** (German.) F. Leonhard. *Zeitschrift für Naturforschung*, v. 9a, no. 12, Dec. 1954, p. 1019-1031 + 1 plate.

Determination of ratios of scattered electrons to the total no. of fired electrons, as a function of at. no., thickness of the dispersing substance, characteristic of the angle, and chromatic distribution of dispersion intensities. Graphs, spectrograms. 6 ref.

7326* The Vibration Structure of the Fluorescence Spectrum of Naphthalene in Solution and in the Crystalline State. **Die Schwingungsstruktur des Naphthalin-Fluoreszenzspektrums in Lösung und im Kristall.** (German.) Hans Christoph Wolf. *Zeitschrift für Naturforschung*, v. 10a, no. 1, Jan. 1955, p. 3-9.

Experimental data on the spectroscopic behavior of naphthalene excited with high-pressure Hg and Xe lamps. Spectrograms, tables, photograph. 17 ref.

7327* Relationship Between Electron-Emission and Luminescence Phenomena of Excited Crystals. **Der Zusammenhang von Elektronenemission und Lumineszenzerscheinungen angeregter Kristalle.** (German.) J. Lepper. *Zeitschrift für Naturforschung*, v. 10a, no. 1, Jan. 1955, p. 47-52.

Experimental study with activated NaCl and $CaSO_4$ crystals on the mechanism of electron emission indicate that the phenomena are caused by the same traps, and the electron emission may be considered a measure of the electron density in the conduction band. Diagram, graphs. 5 ref.

7328* Flow Method of Determining the Proton-Spin Lattice-Relaxation Time of Liquids. **Bestimmung der Protonen-Spin-Gitter-Relaxationszeit von Flüssigkeiten mit einer Strömungsmethode.** (German.) Alexander Ganssen. *Zeitschrift für Naturforschung*, v. 10a, no. 1, Jan. 1955, p. 54-61.

Includes diagrams, oscillograms, graphs, table. 12 ref.

7329* Infra-Red Phosphorescence Light From Germanium at Low Temperatures. **Ultrarotes Phosphoreszenzlicht aus Germanium bei tiefen Temperaturen.** (German.) R. Kessler. *Zeitschrift für Naturforschung*, v. 10a, no. 1, Jan. 1955, p. 87-88.

A Ge monocrystal, optically excited at low temperatures, is shown to phosphoresce on slow reheating to room temperature. Graphs. 1 ref.

7330* Investigation of Luminescence on Uranium-Activated Alkaline Earth Tungstates and Molybdates. **Lumineszenzuntersuchungen an Uran-aktivierten Erdalkaliwolframaten und -molybdaten.** (German.) H. Gobrecht and Werner Weiss. *Zeitschrift für Physik*, v. 140, no. 2, 1955, p. 139-149.

Intensity and spectrum distribution of the luminescence of $CaWO_4$-U, $SrWO_4$-U, $BaWO_4$-U, $CaMoO_4$-U, and $SrMoO_4$-U as functions of composition, heat-treatment, and temperature. Graphs, tables, spectrogram. 5 ref.

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7331 Stability Theory of Differential Equations. Richard Bellman. International Series in Pure and Applied Mathematics. 166 p. 1953. McGraw-Hill, New York. (QA371 B41s)

Properties of linear systems; asymptotic behavior and stability; existence and uniqueness theorems, and stability of solutions of non-linear systems.

7332 Engineering Dynamics. C. B. Biezeno and R. Grammel. v. I. **Theory of Elasticity.** (Translated from the German by M. L. Meyer.) 307 p. 1955. v. III. **Steam Turbines.** (Translated from the German by E. F. Winter and H. A. Havemann.) 264 p. 1954. v. IV. **Internal Combustion Engines.** (Translated from the German by M. P. White.) 282 p. 1954. Blackie and Son, London. (TJ145 B47ttr)

7333 Dynamical Theory of Crystal Lattices. Max Born and Kun Huang. 420 p. 1954. Oxford University Press, London. (QD911 B64d)

Utilizes the general principles of quantum theory to derive the structures and properties of crystals. Detailed work on the thermodynamics of lattices, with the theory of lattice elasticity extended to deal with finite strains.

7334 Forced Oscillations in Non-Linear Systems. Chihiro Hayashi. 164 p. 1953. Nippon Printing and Publishing Co., Osaka, Japan. (QA871 H32f)

Presents a wide variety of non-linear oscillations through a comprehensive method of analysis, with particular attention directed to their stability problem.

7335 Sonics. Theodor F. Hueter and Richard H. Bolt. 456 p. 1955. John Wiley & Sons, New York. (QC243 H87s)

A unified presentation of analysis, testing, and processing of materials and products by the use of vibrations.

7336 Probability Theory. Foundations. Random Sequences. Michel Loève. 515 p. 1955. D. Van Nostrand, New York. (QA273 L82p)

Intuitive background of concepts and problems; notions of measure theory; general concepts and tools of probability theory; independence; dependence.

7337 Matter Energy Mechanics. Jakob Mandelker. 73 p. 1954. Philosophical Library, New York. (QC6 M31m)

Based on the energy concept of matter mc^2, it unifies and extends relativity mechanics by introducing a new kinetic energy formula. Derivation and application of the formula are described.

7338 Existence Theorems for Ordinary Differential Equations. Francis J. Murray and Kenneth S. Miller. 154 p. 1954. New York University Press, New York. (QA371 M96e)

Mathematical fundamentals required for intelligent use of electronic calculators.

7339 Lectures on Partial Differential Equations. I. G. Petrovsky. (Translated from the Russian by A. Shenitzer) English Ed. 245 p. 1954. Interscience Publishers, New York. (QA377 P44L)

A rigorous presentation of principles, significance, and applications.

7340 Geometrical Mechanics and de Broglie Waves. J. L. Synge. Cambridge Monographs on Mechanics and Applied Mathematics. 167 p. 1954. Cambridge University Press, New York. (QC174.2 Sy75g)

The theory of de Broglie waves is developed systematically and supplemented with a process of "primitive quantization".

7341 Selected Papers on Noise and Stochastic Processes. Nelson Wax, editor. 337 p. 1954. Dover Publications, New York. (QA273 W36s)

Six papers on random processes and their applications to physical problems.

7342 The Collected Papers of Peter J. W. Debye. 700 p. 1954. Interscience Publishers, New York. (QC475 D35c)

Fifty-one papers covering X-ray scattering, dipole moments, electrolytes, light scattering, and miscellaneous physical-optical wave phenomena.

7343 Tables of the Error Function and Its Derivative. National Bureau of Standards Applied Mathematics Series 41. 302 p. 1954. U. S. Government Printing Office, Washington, D. C. (QA55 Un3.5a)

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6196 (aging in barium titanate)
6207 (e.m.f. of the MgO-Al_2O_3 system)
6220 (dielectric permeability of ferrites)
6225 (constitution of Zn-ferrite)
6305 (absorption of radiant energy by suspension)
6485 (absorption spectra)
6772 (energy transfer in combustion products)
6826 (electron microscopes)
6896 (theory of cohesion)
7075 (magnetic hysteresis and permeability)
7187 (development in electron microscopy)
7195 (electron microscopy)

PLASTICS

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Effects of type and construction of reinforcing fabric on impregnate properties. Graph, tables.

7345 Ionic Polymerization. A Convenient Synthesis of α- and β-Alkylstyrenes. The Effect of an α-Alkyl Group on the Ultraviolet Absorption Spectra. C. G. Overberger and David Tanner. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 369-373.

By deacetylation of acetates of carbinols. Tables. 22 ref.

7346 Two-Stage Polymerizations. III. Infrared Evidence for the Course of Polymerization of Vinyl Ethers of Unsaturated Phenols. George B. Butler. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 482-484.

Only vinyloxy group is active in first stage. Table. 4 ref.

7347 Photoinitiated Diradical Polymerization of Methyl Methacrylate. W. E. Mochel, J. L. Crandall, and J. H. Peterson. *American Chemical Society, Journal*, v. 77, Jan. 20, 1955, p. 494-495.

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7348 Electrical and Chemical Effects of β-Radiation in Polystyrene. Paul Yen-hsiung Feng and Joseph W. Kennedy. *American Chemical Society, Journal*, v. 77, Feb. 20, 1955, p. 847-851.

Polyethylene and Teflon also studied by β-radiation from a Sr^{90}-Y^{90} source. Tables, graphs, diagram. 23 ref.

7349 Viscoelasticity of Polymethyl Methacrylate—An Experimental and Analytical Study. J. K. Knowles and A. G. H. Dietz. *ASME, Transactions*, v. 77, Feb. 1955, p. 177-184; disc., p. 185-186.

Static tensile stress-strain data for several types; prediction of creep by use of stress relaxation data. Graphs, tables. 21 ref.

7350* A Phase Diagram for Ethylene up to 10,000 Atmospheres Absolute Pressure. **Ein Zustandsdiagramm für Äthylen bis zu 10000 ata Druck.** (German.) H. Benzler and A. v. Koch. *Chemie-Ingenieur-Technik*, v. 27, no. 2, Feb. 1955, p. 71-75.

A new equation of state is given which determines thermic and caloric variables for a wide pressure range. The polymerization of ethylene to polyethylene according to the Mollier diagram. Tables, diagram. 9 ref.

7351* Acetylation of Vinylidene Chloride. (English.) O. Wichterle and J. Vogel. *Collection of Czechoslovak Chemical Communications*, v. 19, no. 6, Dec. 1954, p. 1197-1204.

Structures of products. Graphs. 5 ref.

7352 Glass-Premix Compounds for Molded Parts. Roger White. *Electrical Manufacturing*, v. 55, Mar. 1955, p. 118-125.

Improved properties of materials composed of glass fibers, resins, and fillers; applications. Tables, diagrams, photographs.

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Based on the mechanics of water in a hydrophilic polymer net. Diagrams, table, graphs. 7 ref.

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Measurement of increase in diameter of pipes kept at constant internal pressure. Photographs, tables, graphs.

7355* Vinyl Polymerization. III. Polymerization of Acenaphthylene. IV. Influence of Dimethylaniline on Solution Polymerization of Vinyl Chloride Catalyzed by Benzoyl Peroxides in the Presence of Dimethylaniline. Benzoyl Peroxides in the Presence of Dimthylaniline. Minoru Imoto, Kiichi Takemoto, Takayuki Otsu, Ko Kimura, and Seuckon Choe. *Journal of Polymer Science*, v. 15, Jan. 1955, p. 271-276; Feb. 1955, p. 475-501.

Includes tables, graphs, diagram. 22 ref.

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Flexibility over a wide temperature range and high melting temperature are advantages of new copolymer. Graphs, tables. 33 ref.

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7360* Fluorine-Containing Polymers. II. 1,1-Dihydroperfluoroalkyl Acrylates; Preparation of Monomers. III. Polymers and Copolymers of 1,1-Dihydroperfluoroalkyl Acrylates. IV. Polymers of Acrylates of Fluorine-Containing Ether Alcohols. V. Light Scattering and Viscosity Study of Poly-1,1-Dihydroperfluorobutyl Acrylate. VI. Copolymerization of 1,1-Dihydroperfluorobutyl Acrylate. VII. 1,1-Dihydroperfluoroalkyl Acrylates: Compounding and Properties of Vulcanizates. D. W. Codding, T. S. Reid, A. H. Ahlbrecht, G. H. Smith, Jr., D. R. Husted, F. A. Bovey, J. F. Abere, G. B. Rathmann, C. L. Sandberg, P. J. Stedry, and A. M. Borders. *Journal of Polymer Science*, v. 15, Feb. 1955, p. 515-574.

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Compared with parallel study of steel spheres and Pb pellets. Diagrams, micrographs. 16 ref.

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7363* On Plasticiser Action. **Zur Wirkungsweise der Weichmacher.** (German.) Ernst Jenckel. *Kunststoffe*, v. 45, no. 1, Jan. 1955, p. 3-8.

Measurements of refractive indices in the molten and glass-like state over entire concentration range from pure polymer to pure plasticiser. Graphs, diagrams. 10 ref.

7364* A Contribution to the Problem of Plasticiser Migration. **Beitrag zum Problem der Weichmacherwanderung.** (German.) K. Zöhrer and A. Merz. *Kunststoffe*, v. 45, no. 1, Jan. 1955, p. 9-12.

Relationship between oil solubility and migration is confirmed; limits of extractability by migration into nitrocellulose; influence of time on mixing rolls, roll temperature, and film thickness. Tables. 7 ref.

7365* Chemistry and Technology of the Urea-Formaldehyde Resins. **Chemie und Technologie der Harnstoffharze. I.** Association Theory of Urea-Formaldehyde Resin Formation. **Zur Assoziationstheorie der Harnstoffharz-Bildung.** (German.) Heinz Fahrenhorst. *Kunststoffe*, v. 45, no. 2, Feb. 1955, p. 43-48.

Electron-theory to explain mechanism of addition reactions. 8 ref.

7366* Method for the Determination of Flow Properties of Hardenable Molding Compounds. **Verfahren zur Bestimmung der Fliesseigenschaften von härtbaren Pressmassen.** (German.) C. M. v. Meysenbug. *Kunststoffe*, v. 45, no. 2, Feb. 1955, p. 48-52.

Apparatus which has wide applicability for powders and chips allowing direct comparison. Graphs, diagram, tables, photographs. 5 ref.

7367 Silicones Properties and Uses. Kenneth Rose. *Materials & Methods*, v. 41, Feb. 1955, p. 109-124.

Properties and important applications of silicone fluids, compounds, resins, and rubbers. Photographs, tables, graphs, diagram.

7368 Polymerization by Gamma Rays. Leigh C. Anderson and Joseph J. Martin. *Modern Plastics*, v. 32, Mar. 1955, p. 94-97, 210.

Effects of rays of monomers. Economics of process. Photographs.

7369 Foamed Isocyanates; Formation, Properties, Applications. Kenneth P. Satterly. *Product Engineering*, v. 26, Feb. 1955, p. 140-143.

Types, applications, and properties of these new materials. Table, graphs, photographs.

7370 Studies in Polymerization. IX. The Occlusion of Free Radicals by Polymers: Physical Factors Determining the Concentration and Behaviour of Trapped Radicals. C. H. Bamford and A. D. Jenkins. *Royal Society, Proceedings*, v. 228, ser. A, Feb. 22, 1955, p. 220-237.

Reaction rates in the photopolymerization of acrylonitrile. Diagram, graphs, tables. 8 ref.

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7372* Dielectric Constants and Mechanical Losses in High Polymers. **Dielektrizitätskonstante und mechanische Verluste bei Hochpolymeren.** (German.) Helmut Thurn. *Zeitschrift für angewandte Physik*, v. 7, no. 1, Jan. 1955, p. 44-47.

Dielectric constants, sound-transmitting properties, and ultrasonic damping power as functions of temperature. Diagram, graphs. 18 ref.

7373* Molecular Dimensions of Polymethylmethacrylate in Different Solvents According to the Dispersed-Light Method. **Die Moleküldimensionen von Polymethylmethaerylat in verschiedenen Lösungsmitteln nach der Streulichtmethode.** (German.) H.-J. Cantow and O. Bodmann. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 3, nos. 1-2, Jan. 1955, p. 65-72.

Determination of mol. wt., refraction increments, and distance between fiber ends in different solvents. Tables, graph. 21 ref.

7374* Study of Radical Polymerization of Styrene by the Method of Tagged Atoms. **Izuchenie radikal'noi polimerizatsii stirola metodom mechenykh atomov.** (Russian.) M. M. Koton, T. M. Kiseleva, and M. I. Bessonov. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 12, Dec. 1954, p. 2137-2141.

Includes photograph, graph, tables. 7 ref.

7375* Production and Polymerization of Acrylic and Metacrylic Acid Esters With Nitrophenols. **Poluchenie i polimerizatsiia efirov akrilovoi i metakrilovoi kisloty s nitrofenolami.** (Russian.) N. N. Lebedev and L. V. Andrianova. *Zhurnal Obshchei Khimii*, v. 25, no. 1, Jan. 1955, p. 210-213.

Includes tables. 3 ref.

Books and Miscellaneous Publications

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Comprehensive and critical survey of fundamental and practical knowledge, mainly from the standpoint of reaction kinetics.

See also:

6255 (production of polyethylene)
6311 (analysis of urea formaldehyde condensation products)
6936 (grinding and polishing practices)
7408 (joints in reinforced plastics)
7437 (cellulose for viscose production)

POLLUTION AND WASTES

7377 Particle-Size Distribution in Some Hygroscopic Aerosols. G. R. Gillespie and H. F. Johnstone. *Chemical Engineering Progress*, v. 51, Feb. 1955, p. 74F-80F.

Size of H_2SO_4, H_3PO_4, HCl, HBr, and $ClSO_3H$ aerosols measured by a four-stage high velocity jet impactor. Tables, graphs. 15 ref.

7378 Smog. W. L. Faith. *Chemical Engineering Progress*, v. 51, Feb. 1955, p. 101F-103F.

Sources and types. Photographs, graph.

7379* The Contamination of Rivers by Phenol-Containing Waste Waters. **Die Verunreinigung der Flüsse durch Phenolabwässer.** (German.) Karl Viehl. *Gas- und Wasserfach*, v. 96, Ausgabe Wasser, no. 4, Feb. 15, 1955, p. 105-109.

Composition; effects on aquatic organisms; purification methods. Tables. 22 ref.

7380* Microscopic Evaluation of Dust Samples in Dust-Measuring Processes in the German Coal-Mining Industry. **Die mikroskopische Auswertung der Staubproben beim betrieblichen Staubmessverfahren im deutschen Steinkohlenbergbau.** (German.) Andreas Thaer. *Glückauf*, v. 91, nos. 1-2, Jan. 1, 1955, p. 29-37 + 1 plate.

Methods and equipment of determining mine dust by grain size and composition. Photographs, tables, micrographs. 7 ref.

7381* Routine Process of Measuring Dust in Coal Mines. **Das Routinemessverfahren des betrieblichen Staubmesswesens im Steinkohlenbergbau.** (German.) Hans Breuer and Rolf Leschinski. *Glückauf*, v. 91, nos. 5-6, Jan. 29, 1955, p. 130-138.

Dust-control system and periodic measuring of dust as measures of sanitation and safety. Charts, graphs, tables. 2 ref.

7382 Disposal of Synthetic Detergents. N. Pilpel. *Research*, v. 8, Feb. 1955, p. 62-69.

Problems arising in sewage treatment. Diagrams, photographs. 34 ref.

7383* New Electrostatic Dust-Content Measuring Device. **Neues elektrostatisches Staubgehalts-Messgerät.** (German.) E. Feifel and R. Prochazka. *VDI Zeitschrift*, v. 97, no. 4, Feb. 1, 1955, p. 113-117.

Principle, design, and characteristics of new simple, inexpensive device based on the correlation between dust content and leakage current. Diagrams, photograph, graphs. 19 ref.

Books and Miscellaneous Publications

7384 Dust Is Dangerous. C. N. Davies. 116 p. Faber and Faber, London. (HD7264 D28d)

Assessment of dust concentrations and measures to eliminate hazards in a wide variety of industries.

See also:
6500 (coagulation of aerosols)
7225 (radioactive waste disposal)

RUBBER AND ELASTOMERS

7385 Thermodynamics of Crystallization in High Polymers: Natural Rubber. Donald E. Roberts and Leo Mandelkern. *American Chemical Society, Journal*, v. 77, Feb. 5, 1955, p. 781-786.

Includes tables, graphs. 41 ref.

7386* Antioxidants and Their Influence on the Oxidation of Rubber and Rubber Vulcanizates. **Alterungsschutzmittel und ihr Einfluss auf die Oxydation von Kautschuk und Kautschukvulkanisaten.** (German.) Paul Schneider. *Angewandte Chemie*, v. 67, no. 2, Jan. 21, 1955, p. 61-68.

Test methods, mode of action, and secondary reactions; use of secondary aromatic amines, phenols and certain heterocyclic compounds as antioxidants. Graphs, tables, structural formulas. 62 ref.

7387* Diffusion and Solubility of Oxygen and Hydrogen in Sodium Butadiene Rubber at Various Stages of Its Oxidation. **Diffuziia i rastvorimost' kisloroda i vodoroda v natriibutadienovom kauchuke na raznykh stadiiakh ego okisleniia.** (Russian.) L. L. Shanin. *Doklady Akademii Nauk SSSR*, v. 99, no. 6, Dec. 21, 1954, p. 1053-1056.

Experimental data and formulas. Tables, graphs. 6 ref.

7388* Preview of the New Industrial Plant for Rubber Synthesis in the Hüls Chemical Works. **Vorschau auf die neue grosstechnische Kautschuksynthese-Anlage bei den chemischen Werken Hüls.** (German.) Paul Baumann. *Erdöl und Kohle*, v. 8, no. 1, Jan. 1955, p. 49-50.

Reviews the possibilities and economic feasibility of producing butadiene from raw materials readily available to Germany. Tables.

7389 The Interaction of Polymerizing Systems With Rubber and Its Homologues. III. Transfer and Retardation in the Polymerization of Vinyl Acetate. P. W. Allen, F. M. Merrett, and J. Scanlan. *Faraday Society, Transactions*, v. 51, Jan. 1955, p. 95-106.

Vinyl acetate is selectively retarded by dihydromyrcene. Tables, graphs. 21 ref.

7390* Thermal Effect of the Expansion and Relaxation of Rubber. **Effet thermique de l'extension et de la détente du caoutchouc.** (French.) J. P. Ehrbar and Ch. G. Boissonnas. *Helvetica Chimica Acta*, v. 38, no. 1, Feb. 1955, p. 125-134.

Temperature evolution corresponding to an adiabatic process was evaluated for stretched natural and synthetic rubber samples and the rise in temperature measured by a themocouple. Graphs, table, diagram. 23 ref.

7391* Testing Rubber Products Used in the Mining Industry. **Prüfung von Gummierzeugnissen im Bergbau.** (German.) H. Meiners. *Kautschuk und Gummi*, v. 8, no. 1, Jan. 1955, p. 8-10.

Methods for testing properties of rubber conveyor belts and compressed-air tubes. Diagram, table, photograph.

7392* The Vulcanization of Highly Elastic Polymers. **Zur Kenntnis der Vulkanisation hochelastischer Polymerisate. II-III.** Vulcanization of Natural Rubber With Thiuan Disulfides. **Die Vulkanisation des Naturkautschuks durch Thiuramdisulfide.** (German.) Walter Scheele, Otto Lorenz, and Wilhelm Dummer. *Kautschuk und Gummi*, v. 8, no. 1, Jan. 1955, p. 2WT-8WT; no. 2, Feb. 1955, p. 27WT-31WT.

The kinetics of thiuram vulcanization; effects of temperature and diffusion; correlation of critical value of dithiocarbaminate formation with macromolecular structure of polyisoprene. Tables, graphs. 4 ref.

7393* Effect of Ozone on Neoprene Vulcanizates and the Influence of Several Age Resistors and Fillers. **Über die Einwirkung von Ozon auf Neoprene-Vulkanisate und den Einfluss einiger Alterungsschutzmittel und Füllstoffe.** (German.) A. Hartmann and F. Glander. *Kautschuk und Gummi*, v. 8, no. 2, Feb. 1955, p. 35WT-39WT.

Response of stressed rubber; effect of age resistors on rate and temperature of cracking; examination of vulcanizates with different fillers and neoprene content. Photographs, graphs, tables, diagram. 11 ref.

7394* Cold Rubber. **Tieftemperatur-Kautschuk.** (German.) Philipp Orth. *Kautschuk und Gummi*, v. 8, no. 2, Feb. 1955, p. 40WT-44WT.

Effect of polymerizing temperature on structure, mol. wt., and physical properties; properties of "resin-extended cold rubber". Tables, graphs. 10 ref. (To be continued.)

7395* Migration and Even Distribution of Sulfur in Rubber Mixtures. **O migratsii i ravnomernom raspredelenii sery v rezinovykh smesiakh.** (Russian.) G. A. Blokh, V. Ia. Demidionova, G. P. Miklukhin, I. I. Kukhtenko, A. F. Rekasheva, R. V. Nikulina, and M. I. Przhebyl'skii. *Legkaia Promyshlennost'*, v. 15, no. 1, Jan. 1955, p. 28-30.

Mixing conditions and measurement of radioactive sulfur. Tables, diagrams. 3 ref.

7396 The Use of GR-S, Sodium Rubber and Neoprene in Truck Tires. W. W. Rinne, I. J. Sjothun, and P. S. Greer. *Rubber Age*, v. 76, Feb. 1955, p. 709-714.

Tires with 35% synthetic equal natural rubber tire performance. Sodium-catalyzed rubber is better than cold rubber. Tables, graphs. 8 ref.

7397 Statistical Design in Compounding Elastomers. W. L. Gore. *Rubber Age*, v. 76, Feb. 1955, p. 719-720.

Demonstrates Latin square design. Tables.

7398 The Butyl Story—A Panel Discussion. Butyl Rubber—Processing and Products. B. J. Ferkes. **Butyl Tubes.** L. C. Peterson. **Butyl Rubber Mechanical Goods.** K. W. Stevens.

Rubber and Elastomers

Butyl Reclaim. Clyde F. Hoover. *Rubber Age*, v. 76, Feb. 1955, p. 721-725, 771.

See also:

6306 (determination of S in rubber)
6428 (polymerizable silanes)
6502 (catalytic copolymerization)
7360 (vulcanizates of fluorine-containing polymers)
7369 (foamed isocyanates)

SPACE HEATING AND CONDITIONING

Books and Miscellaneous Publications

7399 Modern Electric and Gas Refrigeration. Andrew D. Althouse and Carl H. Turnquist. 5th Rev. Ed. 945 p. 1954. Goodheart-Willcox Co., Chicago. (TP497 AL79m5)

Basic principles, refrigerants, motor controls, specifications and servicing of electric compressor- and gas-fired-absorption types; hermetic systems; home freezers; air conditioning.

TEXTILES AND FIBERS

7400* Fundamentals in the Continuous Dyeing of Cotton Fabrics With Vat Dyestuffs. **Fundamentos de la tintura a la continua de los tejidos de algodón con colorantes tina.** (Spanish.) José M. Jubany Socas. *Acero y energía*, v. 11, no. 66, Nov.-Dec. 1954, p. 37-41.

Advantages and disadvantages; methods of application; impregnation and reduction methods. Table, graphs, diagrams. 10 ref.

7401* Some Design Features of a Pilot Plant Continuous Range for Chemical Treatment of Cotton Yarn and Fabrics. Esmond J. Keating, Albert S. Cooper, Alton L. Murphy, and Herbert O. Smith. *American Dyestuff Reporter*, v. 44, Jan. 31, 1955, p. 65-68.

Includes photographs, diagram. 4 ref.

7402* The Dyeing Characteristics of Different Wool Grades. William F. Brommelsiek, Werner Von Bergen, and Henry E. Millson. *American Dyestuff Reporter*, v. 44, Jan. 31, 1955, p. 73P-86P; disc., p. 86P.

Effects of fiber fineness. Tables, graphs, micrographs, photographs. 7 ref.

7403* Investigation Into the Use of Diammonium Phosphate in the Dyeing of Dacron and Dacron-Wool Blends. George W. Spicer. *American Dyestuff Reporter*, v. 44, Jan. 31, 1955, p. 87P-88P.

Controllable one-bath process for production of various shades. Tables.

7404* Adsorption of Available Chlorine and Quaternary by Cotton and Wool Fabrics From Disinfecting Solutions. M. T. Goldsmith, M. A. Latlief, J. L. Friedl, and L. S. Stuart. *Applied Microbiology*, v. 2, Nov. 1954, p. 360-364.

Requirements of various germicides for *Escherichia coli* and *Micrococcus pyogenes* var. *aureus* 209 in various concentrations. Tables, graphs. 9 ref.

7405* Investigation of Textile Materials by Electron Microscopic Methods. **Untersuchung der Textilmaterialien mit elektronenmikroskopischen Methoden.** (German.) P. Kassenbeck. *Mikroskopie*, v. 62, no. 3, Jan. 1955, p. 200-204.

Improved method of preparing textile fibers and replicas for electron-microscopic investigations. Photograph, micrographs.

7406* Analyzing the Nonuniformity of Yarns, Roves, and Tapes by Means of the Wave Length Spectrum. **Analysierung der Uugleichmässigkeit von Garnen, Vorgarnen und Bändern an Hand des Wellenlängenspektrums.** (German.) E. Felix. *Textil-Rundschau*, v. 10, no. 1, Jan. 1955, p. 1-9.

Determination of type and magnitude of nonuniformity with a spectrograph. Spectrograms, photographs, graphs.

7407* The Importance of Rayon in the Dyeing Plant and in Modern Equipment. **Die Bedeutung der Viskose-Zellwolle in der Färberei und in der modernen Ausrüstung.** (German.) Peter Haering. *Textil-Rundschau*, v. 10, no. 1, Jan. 1955, p. 9-11.

General discussion on improvements in quality and dyeing of rayon and mixtures of rayon with other textile fibers. Tables, textile samples.

See also:

6720 (future market for textiles)

WELDING AND JOINING

7408* Joints in Reinforced Plastic. **Verbindingen in gewapende plastics.** (Dutch.) P. L. H. Verbunt. *Bedrijf en Techniek*, v. 10, no. 219, Jan. 15, 1955, p. 34-36.

Practical suggestions for gluing, riveting, bolting, screwing, coating, and repairing of reinforced plastics. Tables, diagrams.

7409 Welded Structure for the Hunstanton Secondary Modern School. G. H. Smith. *British Welding Journal*, v. 2, Feb. 1955, p. 49-55.

Welding problems in construction of building framework. Diagrams, photographs.

7410 Fusion Welding of Aluminium Alloys. VII. Recording Porosity in Aluminium-Alloy Welds. P. T. Houldcroft and A. A. Smith. *British Welding Journal*, v. 2, Feb. 1955, p. 67-74.

Severity of porosity classification system. Micrographs, diagrams, tables.

7411 Weldability of a C-Mn Steel Related to Properties of the Heat-Affected Zone. C. L. M. Cottrell. *British Welding Journal*, v. 2, Feb. 1955, p. 75-80; disc., p. 80.

Effects of temperature and cooling rates on mechanical properties of the heat affected zone. Graphs, tables, micrographs. 10 ref.

1412* Mineral Use in Coated Welding Electrodes. Richard M. Stewart. *California Journal of Mines and Geology*, v. 51, Jan. 1955, p. 9-19.

Function of rutile, limestone, and other minerals in coatings. Availability and prospects for use of new minerals. Photographs, tables, diagram. 4 ref.

7413* Problem of Fracture During Arc Welding of Alloy Steels. **El problema de la fisuracion al soldar por arco los aceros aleados.** (Spanish.) F. Donis Ortiz. *Ciencia y técnica de la Soldadura*, v. 4, no. 20, Sept.-Oct. 1954, 16 p.

Metallographic structures and use of electrodes; preparation of joints; preheating and heat treatments. Graphs, tables, photographs. (To be continued.)

7414 Joints Brazed With New Nickel-Base Alloys Exhibit Good Properties. C. V. Foerster and R. C. Kopituk. *Iron Age*, v. 175, Feb. 24, 1955, p. 79-82.

Mechanical properties and corrosion resistance of brazing alloys for heat resistant metals. Table, photographs, graphs.

7415 Sigma Welding for Light Metals. Byron R. Russell. *Light Metal Age*, v. 12, Feb. 1955, p. 10-12, 28.

Advantages and disadvantages in current commercial practice. Photographs.

7416 How to Weld Some Wrought High Alloys. R. P. Culbertson. *Materials & Methods*, v. 41, Feb. 1955, p. 98-102.

Characteristics that must be considered in joint design and welding procedures. Tables, photographs, diagrams.

7417 Problems of Adhesion. B. V. Deryagin. *Research*, v. 8, Feb. 1955, p. 70-74. (Condensed from *Vestnik Akademii Nauk SSSR*, v. 7, 1954, p. 30.)

Research on mechanisms and principles of adhesives. Diagrams. 1 ref.

7418* Study of the Weldability of 37 H.S. Steels. Test Results. **Etude de l a soudabilité des aciers à 37 H.S. Résultats d'essais.** (French.) J. Massinon. *Revue de la soudure (Brussels)*, v. 10, no. 4, 1954, p. 216-228.

Investigates elastic limit, brittle fracture, and aging of eight steel castings. Tables, graphs, diagrams, photographs.

7419* Welding in Steel Structure. **Schweissen im Stahlbau.** (German.) A. Battig. *Schweisstechnik*, v. 8, no. 11, Nov. 1954, p. 121-127.

Review of types of welding with special emphasis on bridges. Photographs, drawings.

7420* Flame Shaping and Straightening. **Das Richten mit der Flamme.** (German.) Richard Pfeiffer. *Schweisstechnik*, v. 8, no. 11, Nov. 1954, p. 128-131.

Discusses principles and rules; relationship between heat, stress, and deformation; equipment. Photographs, diagrams. (To be continued.)

7421* Effects of Electrode Properties on Welding Costs. **Elektrodegenskapernas inflytande på svetsekonomin.** (Swedish.) E. J. Magnusson. *Svetsaren*, v. 19, nos. 2-3, 1954, p. 23-31, 34-39.

Effects of fusion coefficient, deposition efficiency, and amperage on welding speed; formulas for comparing electrodes. Graphs, diagrams, photograph, tables. 13 ref.

7422* Application of TTT Diagrams to Determination of Welding Conditions of Hardenable Structural Steel. **Tillämpning av TTT-diagram för bestämning av svetsningsbetingelser för härdbara konstruktionsstål.** (Swedish.) Lauri Pietiläinen. *Svetsaren*, v. 19, nos. 2-3, 1954, p. 50-58.

Post-heating cycles for welds in alloy steels. Graphs, table, photograph, micrographs. 5 ref.

7423 How to Arc Weld the Different Types of Stainless Steels. II. Lester F. Spencer. *Welding Engineer*, v. 40, Mar. 1955, p. 32-34.

Effects of welding procedures on structure and properties of ferritic and martensitic types. Photograph, table. 8 ref.

7424 The Macro Etch System of Evaluating Quality of Resistance Welding. D. O. Samuelson and F. G. Harkins. *Welding Journal*, v. 34, Feb. 1955, p. 105-111.

Nondestructive testing technique for quality control of stainless steel spot welds. Photographs, tables, graphs, micrographs.

7425 Properties of Welds in Al-Mg-Mn Alloys 5083 and 5086. L. A. Cook, S. L. Channon, and A .R. Hard. *Welding Journal*, v. 34, Feb. 1955, p. 112-127.

Welding characteristics and mechanical and physical properties of weld joints. Photographs, tables, graphs. 11 ref.

7426 New Techniques in Inert-Gas-Shielded Metal-Arc Welding. R. W. Tuthill. *Welding Journal*, v. 34, Feb. 1955, p. 137-141.

Techniques for using CO_2 as a shielding atmosphere. Photographs, graph, diagram. 5 ref.

7427 Brazing Molybdenum for High-Temperature Service. M. I. Jacobson and D. C. Martin. *Welding Journal*, v. 34, Feb. 1955, p. 65S-74S.

Techniques for producing joints for high temperature service. Tables, graphs, diagrams, photographs, micrographs.

7428 Direct Explosion Tests of Welding Procedures in Ship Plate. G. S. Mikhalapov and W. A. Snelling. *Welding Journal*, v. 34, Feb. 1955, p. 97S-104S.

Data for welds in semi-killed and rimmed steels. Tables, graphs, photograph. 6 ref.

7429 Significance of Recent Resistance Welding Research. J. E. Roberts. *Welding and Metal Fabrication*, v. 23, Feb. 1955, p. 64-69.

Review of developments in spot and projection welding of steel and Al. Table, graph, diagrams, photographs. (To be continued.)

7430 Progress in "Koldwelding". W. A. Barnes. *Wire and Wire Products*, v. 30, Feb. 1955, p. 179, 218-220.

Applications of cold welding of Al and Cu; production tools. Diagrams.

Books and Miscellaneous Publications

7431 S.S. Ocean Vulcan Static Experiments. Admiralty Ship Welding Committee. Report No. R.6 (Structural Test in Still Water on Welded Dry Cargo Ship). 49 p. + 110 plates. 1953. British Information Services, New York. (TK4660 G79r)

Investigates stress response of a welded ship, under various conditions of loading in still water.

7432 S.S. Clan Alpine Static Experiments. Admiralty Ship Welding Committee. Report No. R.7 (Structural Tests in Still Water on Riveted Dry Cargo Ship). 18 p. + 125 plates. 1953. British Information Services, New York. (TK4660 G79r)

Observation of stresses near midship by known changes of loading and their deflections of the ship's girder.

7433 S.S. Ocean Vulcan Sea Trials. Admiralty Ship Welding Committee. Report No. R.10 (Loaded Condition). 13 p. + 187 plates. 1953. British Information Services, New York. (TK4660 G79r)

Results of the detailed analysis of one section of the structural trials at sea which investigated the relative behavior of welded and riveted ships.

7434 S.S. Ocean Vulcan Sea Trials. Admiralty Ship Welding Committee. Report No. R.11 (Ballast Condition). 11 p. + 124 plates. 1954. British Information Services, New York. (TK4660 G79r)

Detailed analysis of the relative behavior of welded and riveted ships in ballast.

7435 International Acetylene Association Proceedings—1948, 1949, and 1950. 496 p. International Acetylene Association, New York. (TP765 In8p)

Includes 30 papers covering use of acetylene in welding, cutting, and heat treatment of metals; chemical uses; and safety precautions.

7436 Adhesion and Adhesives. Fundamentals and Practice. 229 p. 1954. John Wiley & Sons, New York. (TP968 Ad41)

With the art of adhesion far ahead of the science, 43 papers are presented to show the advancements being made in both cases, with the primary objective of discussing the status of basic knowledge.

See also:

6972 (internal stresses in weldments)
6992 (properties of welding elbows)
6993 (stresses in fillet welds)
7060 (hydrogen embrittlement during welding)
7066 (welding of cast Al)
7067 (σ phase in welded stainless steel)
7068 (fatigue of butt welds)
7069 (filler metal strengths)
7097 (continuous welding of pipe)
7193 (weldability test)

WOOD AND FOREST PRODUCTS

7437* Problem of the Quality of Cellulose for the Viscose Industry. **K voprosu o kachestve tselliulozy dlia viskoznoi promyshlennosti.** (Russian.) V. I. Ivanov. *Bumazhnaia Promyshlennost'*, v. 29, no. 12, Dec. 1954, p. 5-8.

Investigates the chemical behavior of cellulose in relation to alkaline and acidic media. Structural formulas. 12 ref.

7438* High Yield Production of Pulp and Semipulp. **Proizvodstvo drevesnoi polutselliulozy i tselliulozy s vysokim vykhodom.** (Russian.) N. A. Rozenberger. *Bumazhnaia Promyshlennost'*, v. 29, no. 12, Dec. 1954, p. 8-12.

Describes entire pulping process and the production of monosulfite and soda semipulps for corrugated cartons. Diagrams, table.

7439* Problems of the Microscopic Investigations of Paper. **Probleme der mikroskopischen Papieruntersuchung.** (German.) Hans Bucher. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 21, no. 2, Feb. 1955, p. 55-63.

Method of identifying different types of fiber cells and the various stages of integration of these cells by means of pigment solutions; investigation of fillers, grain sizes, differences in crystalline structure, impurities, and orientation of fibers. Micrographs. 12 ref.

7440* The Coordinate Role of Alum in the Sizing of Paper. R. M. Karapetoff Cobb and Donald V. Lowe. *Tappi*, v. 38, Feb. 1955, p. 49-65.

Studies from the viewpoint of coordination of both cellulose fiber and insoluble rosin sizing precipitate by Al ion. Tables, graphs. 44 ref.

See also:

6551 (moisture pick-up of roofing paper)
6607 (corrosion of pulping equipment)
7228 (chemistry of lignin)